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FIFTIETH ANNUAL REPORT OF THE BOARD OF WATER COMMISSIONERS

WATER WORKS

TO THE

COMMON COUNCIL OF THE CITY OF DETROIT

FOR YEAR
ENDING JUNE 30TH
1902.

Calvert Lith Co. Detroit

Ach.

J. B. Davis.

FIFTIETH ANNUAL REPORT

OF THE

BOARD OF WATER COMMISSIONERS

OF THE CITY OF DETROIT

TO THE

COMMON COUNCIL OF THE CITY OF DETROIT,

TOGETHER WITH THE

REPORTS OF THE OFFICERS OF THE BOARD

FOR YEAR

ENDING JUNE 30TH, 1902.

DETROIT FREE PRESS PRINTING COMPANY,
1902.

CONTENTS.

	PAGE.
Report of the Commissioners	5
Financial Report of the Secretary	8
Report of the General Manager	26
Report of the Civil Engineer	34
Report of Superintendent of Meters and Inspection	41
Report of Chief Engineer at Pumping Works	50
Report of the Superintendent of Construction	54
Supplement	73

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THE BOARD OF WATER COMMISSIONERS

OF THE

CITY OF DETROIT.

RATES JULY 1, 1900.

METER RATES.

Payable Quarterly.	QUARTERLY
First 30,000 gals	$1 75
All in excess of 30,000 gals	2¼ cts. per M.
Minimum Rate	1 75

ASSESSMENT RATES.

	PER ANNUM
For Family, household purposes	$2 60
Additional Families to first, in same house supplied through same faucet, each family	1 40
Green Houses.—Special rates.	
Private Stable, for each horse	1 20
Livery Stables, " " "	1 20
Dray and Team Horses, each	60
Cows, each	60
Stores and Offices, from	$1 00 to 12 00
Bakeries, average daily use for each barrel of flour	2 00
Groceries and Provision Stores, from	$3 00 to 50 00
Saloons, from	6 00 to 50 00
Bar, with faucet, from	8 00 to 50 00
Fish Houses, from	6 00 to 50 00
Beer Pump	2 00
Barber Shops, each chair	2 00
Slaughter Houses.—Special rates.	
Hotels and Taverns, in addition to family rate, each room	60
Boarding Schools, from	$4 00 to 50 00
Printing Offices.—Special rates.	
Butcher Stalls, each not less than	3 00
Workshops, for 10 persons or under	3 00
" for each additional 10 persons	1 00
Boarding Houses, in addition to family rate, each boarder or roomer,	40
Estimated quantities of water each 1,000 gallons	07
Building Purposes, each 1 M brick	03
" " " 100 yards plastering	05
" " " perch stone	01
" " minimum	50

FIXTURES.

Bath Tub, for families, 1st tub	$1 00
" " each additional tub	60
" " public, each tub	4 00
Automatic Water Closets, for family, 1st closet	1 60
" " " each additional	60
" " " for hotels, stores, factories, etc., for 10 persons	2 00
" " " each additional person	20
Rod Water Closets, not less than	6 00
Urinals, not less than	2 00
Wash Hand Basins, for family, each	50
" " " for other purposes, each person	15
Hose Bibb or Connection, premises 30 feet front or less	60
" " " " 30 feet to 60 feet	80
" " " " 60 feet to 100 feet	1 60
Special Rates for larger grounds.	
Fountains	$5 00 to 20 00
Street Sprinklers, each wagon	50 00

Where there is a waste of water an increase of rates will be made.

BOARD OF WATER COMMISSIONERS OF THE CITY OF DETROIT.

MEMBERS:

JOHN ZYNDA, 1903. DARIUS D. THORP, 1905.
EDWARD W. PENDLETON, 1904. JOSEPH J. CROWLEY, 1906.
JOHN SCHROEDER, 1907.

COMMITTEES:

Ways and Means	Commissioners PENDLETON, CROWLEY.
Extension and Construction,	Commissioners CROWLEY, PENDLETON.
Pumping Works	Commissioners THORP, SCHROEDER.
Supplies	Commissioners SCHROEDER, THORP.

The President is ex-officio member of each committee.

OFFICERS:

President	JOHN ZYNDA.
Vice-President	EDWARD W. PENDLETON.
General Manager	H. S. STARKEY.
Secretary	BENJ. F. GUINEY.
Superintendent of Construction	LUKE CROSSLEY.
Supt. of Meters and Inspection	THOMAS R. PUTNAM.
Civil Engineer	CLARENCE W. HUBBELL.
Chief Engineer at Pumping Works	URIAH GOULD.
Bookkeeper	W. W. WILCOX.
Receiving Clerk	GEORGE E. KUNZE.
Cashiers	S. G. ROOD. CHARLES W. KEENA.
Meter Clerk	ARTHUR J. STORM.
Permit Clerk	GERALD P. MONAGHAN.
Collectors	FRANK PETZ. R. Z. ROUSSEAU. ANTHONY VOGEL. ANTHONY J. LOOK. THOS. DALTON. JOHN J. ROBINSON. M. A. DETTLING. THOMAS J. CLANCY.
Supt. Storage Grounds	R. J. ECHLIN.

REPORT

OF THE

BOARD OF WATER COMMISSIONERS

OF THE

CITY OF DETROIT.

To the Honorable the Common Council:

GENTLEMEN—The Board of Water Commissioners of the City of Detroit respectfully submits herewith its report for the fiscal year ending June 30th, 1902.

The financial transactions, the work of construction and maintenance and the details of pumping water, are fully set forth in the reports of the various officers of the Board, herewith transmitted, and to which you are respectfully referred.

The total receipts for the year amounted to the sum of $631,036.40, of which $80,000.00 was received from the village of Woodmere, and $70,082.61 from the village of Hamtramck, a total of $150,082.61.

The total expenditures for the same period were $643,542.46, of which the sum of $450,639.91 was expended for construction, $124,959.44 for operation and maintenance, $59,573.62 for interest, $4,369.49 under the Hurlbut Will, and $4,000 for purchase bonds.

The total number of families on the assessment rolls July 1st, 1902, was 64,824, and increase of 2,443 from July 1st, 1901.

There are but 106 families within the corporate limits not supplied with water.

The amount of water pumped during the year was 18,333,104,706 gallons. The average daily consumption, per capita, was 153 gallons.

Work on the addition to the engine house is nearing completion.

The important question of an increased head of water for the northern portion of the city has received proper consideration by the Board, and in this connection the work of installing the two high pressure engines, each with a daily capacity of 25,000,000 gallons, and the construction of the additional 42-inch main, heretofore reported to your honorable body, are in progress and, it is expected, will be completed in the early spring. The difficulty of obtaining materials has unavoidably delayed this work.

No bonds became due during the year. Bonds to the amount of $50,000 will mature August 1st, next, and will be paid from the sinking fund.

A large amount of work has been done at the pumping works in the construction of new conduits, intakes from the settling basin, perfecting the system of connecting strainer wells, and in the commencement of a 10-foot brick intake tunnel, which will be extended to the head of Belle Isle, thereby furnishing a sufficient supply of water to meet the requirements of the city for many years to come, and also assuring the purest of water. Details of the work already completed are set forth in the reports of the Civil Engineer and Superintendent of Construction.

The increase to the distribution system during the year was 10 miles and 180 feet. The total mileage of the system July 1st, 1902, was 581 miles and 2,972 feet.

Contracts were entered into for extending the water system through the villages of Woodmere and Hamtramck. Said villages have deposited with the Board the amounts of the estimated cost for this work.

The villages will pay double the city rate for all water furnished and the plants become a part of the city system and the property of this Board.

All of which is respectfully submitted.

JOHN ZYNDA,
E. W. PENDLETON,
DARIUS D. THORP,
JOSEPH J. CROWLEY,
JOHN SCHROEDER,

The Board of Water Commissioners of the City of Detroit.

July 1, 1902.

REPORT OF THE SECRETARY.

Detroit, July 1, 1902.

To the Board of Water Commissioners of the City of Detroit:

Gentlemen—I have the honor to submit the Secretary's Report for the year ending June 30, 1902.

During the year the Board has received from the Villages of Hamtramck and Woodmere the sums of $70,082.61 and $80,000.00, respectively, for the estimated cost of installing water systems in those villages, to be supplied by the Water Works of Detroit. These items are included in the summary of receipts and the total is correspondingly increased.

The following is a detailed statement of the receipts and disbursements:

Receipts.

Water Rates Account.—		
Rates received		$372,565 76
Percentage Account.—		
From delinquents	$5,422 78	
For shutting off	316 55	5,739 33
Plumbers License Account.—		
Received for licenses		721 00
Service Connection Account.—		
Service connection	5,507 75	
Labor and material	242 03	5,749 78
City of Detroit Account.—		
General tax levy		75,000 00
Iron Pipe Extension Account.—		
Material and labor	3,155 21	
Bonuses for laying water mains	2,283 71	5,438 92

Hurlbut Fund Account.—		
Received from trustees of fund	$5,000 00	
Interest	35 07	$5,035 07
Real Estate Account.—		
Rents	1,937 84	
Sale of lots 18 and 81 Krolik's subdivision to Board of Education	200 00	2,137 84
Meter Account.—		
Sale of meters and meter repairs		268 74
Interest Account.—		
On deposit, general fund	4,509 38	
On deposit, sinking fund	2,908 08	7,417 46
Pumping Water Account.—		
Sale of material		153 81
Service Extension Account.—		
Service extensions (formerly made)		104 34
Engineering Account.—		
Engineering services and material		353 66
Repairing Leaks Account.—		
Labor		16 63
Office Account.—		
Sale of registers and rolls		33 00
Pumping Works Account.—		
Sale of material		218 45
Village of Hamtramck.—		
For estimate of cost of water system		70,082 61
Village of Woodmere.—		
On account of estimate of cost of water system		80,000 00
Total receipts		$631,036 40

Disbursements.

OPERATION AND MAINTENANCE.

Office Account.—	
Manager, secretary, clerks, etc	$ 20,939 79
Watchmen and janitors	1,986 50
Carpenter and general work	1,595 23
Scrubbing	153 00
Books, stationery, printing and binding	958 09
Printing Annual Reports	405 75
Telephones	243 00
Advertisements and subscriptions	122 21
Postage and stamped envelopes	208 40

Towels and supplies	$ 78 00	
Premium on guarantee bonds	60 00	
Street car tickets	10 00	
Rubber Stamps	19 55	
Disinfectant	11 00	
Ice	54 79	
Gas and electric power	11 75	
Telegrams and express	65	
Horse care	165 00	
Horseshoeing	37 00	
Harness repairs	2 25	
Refund water rates	8 80	
Legal services	226 27	
Miscellaneous	104 75	
		$ 27,401 78
Inspection Account.—		
Inspectors and clerks	$ 6,414 00	
Street car tickets	215 00	
Stationery and books	18 15	
Express charges	1 40	
Electric lamp supplies	11 40	
		$ 6,659 95
Percentage Account.—		
Labor	$ 5,837 09	
		$ 5,837 09
Pumping Water Account.—		
Engineers, firemen, etc	$ 23,847 86	
Coal	24,732 52	
Unloading coal	3,214 37	
Boiler and engine supplies	312 19	
Engine oil	331 36	
Kerosene and gas	20 64	
Waste packing and rags	346 30	
Electric light supplies	1,415 37	
Ice	29 00	
Telephone	60 59	
Printing and stationery	9 05	
Paint, oil and glass	48 67	
Advertising	18 29	
Hay and bedding	54 23	
Hose and couplings	25 35	
Repairs to boilers and engines	1,306 37	
Horseshoeing	12 50	
Express charges	3 00	
Miscellaneous	127 13	
Boiler inspection	36 00	
		$ 55,950 79

Repairing Leaks Account.—		
Superintendent, clerks, watchmen and labor	$ 5,875 22	
Horse care	210 00	
Horseshoeing	15 00	
Harness, wagon supplies	5 50	
Lumber	1 80	
Cartage	145 31	
Telephone	24 00	
Rubber boots	7 38	
Tools and repairs	8 71	
Car fare	50 00	
Oil	1 88	
Pavement repairs and inspection	1,892 79	
Bicycle repairs	6 65	
Miscellaneous	35 65	
		$ 8,279 89
Meter Repairs and Expense Account.—		
Labor	$ 1,001 75	
Fittings	521 82	
Freight	59	
		$ 1,524 16
Service Connections Account.—		
Labor	$ 10,111 26	
Service cocks, sleeves and valves	3,732 56	
Car fare	230 00	
Telephone	24 00	
Tools	23 70	
Stationery	28 55	
Oil	4 90	
Repairs and tools to tapping machine	77 00	
Lead seals	3 50	
Lead pipe and solder	60	
Miscellaneous	10 40	
		$ 14,246 47
Office Furniture and Fixtures Account.—		
Repairs	$ 39 46	
Shades and fixtures	51 59	
Michigan Fire Auxiliary, rental	20 00	
		$ 111 05
Horse, Wagon and Harness Account.—		
Harness repairs	$ 271 24	
Labor	5 17	
Wagon repairs and cutter	66 53	
Phaeton and repairs	98 50	
Harness oil	17 69	
		$ 459 13

Real Estate, Revenue and Expense Account.—

Painting, papering, storage yard	$ 260 20	
Pattern house, storage yard, brick, paint, etc.	812 20	
Flag, and decorating building	29 37	
Paint, oil, etc., storage yard	107 09	
Nails, hardware, etc	226 44	
Cost and placing memorial tablet	264 90	
Lumber	630 91	
Insurance premium	29 90	
Roof repairs and repairs to office bldg.	290 13	
Lumber	8 25	
Sidewalks at storage yard	225 00	
Repairs to siding	113 09	
Abstract	7 00	
Coal, storage yard	77 53	
Coal, office	80 54	
		$ 3,162 55

Service Cocks, Horse Expense Account.—

Shoeing	$ 103 56	
Feed	493 77	
Drugs	15 85	
Bedding	24 00	
Barn tools	25 65	
		$ 662 83

Repairing Leaks, Horse Expense Account.—

Shoeing	$ 104 57	
Feed	493 77	
Drugs	14 48	
Bedding	25 25	
Barn tools	25 68	
		$ 663 75
		$124,959 44

FOR CONSTRUCTION

Iron Pipe Construction Account.—

Superintendent and clerks	$ 5,616 56
Foremen	3,024 54
Watchmen, teamsters, plumbers, bricklayers and barnmen	8,460 80
Labor	79,299 71
Iron pipe	131,181 00
Special castings	5,956 40
Gates, valves and hydrants	7,070 73
Gate well covers	650 46

Tools	$427 33	
Repairing tools	119 04	
Lumber	2,594 57	
Coal and coke	488 95	
Oil	97 64	
Cement, sand, brick, stone and lime	3,068 56	
Rope, blocks, rubber, packing, waste	631 30	
Paint, lead, etc	33 84	
Car fare	160 00	
Cartage	1,637 42	
Stationery and printing	224 98	
Wood plugs and rollers	108 24	
Rubber boots	43 14	
Channel iron rails and beams	241 55	
Pig and sheet lead	8,743 10	
Lead pipe, tin and solder	232 11	
Telephone	212 40	
Iron, globes, hardware, bolts and nuts and nails	667 20	
Service cocks	18 00	
Advertising	15 00	
Telegrams and freight	30 45	
Refund laying pipe	174 82	
Repairs to pump	73 42	
Hose and couplings	491 83	
Inspector Board of Public Works	761 85	
Forge and equipment and repairs	89 40	
Windlass, chain and jacks	192 46	
Bicycle repairs	5 50	
Pavement repairs	5 61	
Injuries and physicians' services	233 00	
Miscellaneous	270 78	
		$263,353 69
Meter Account.—		
Superintendent and labor	$4,597 96	
Meters	4,801 12	
Lumber	192 88	
Horse board	165 00	
Horseshoeing	35 00	
Lead, solder, etc	47 68	
Specials and fittings	162 57	
Telephones	44 53	
Packing and rags	25 92	
Bicycle repairs	16 50	
Tools	11 96	

Printing and stationery	$ 5 95	
Gasoline and oil	6 44	
Nails and hardware	11 70	
Harness repairs	3 60	
Freight and express	1 60	
Miscellaneous	12 06	
		$ 10,142 47
Engineering Account.—		
Civil engineer and assistants	$ 10,731 06	
Instruments	197 45	
Tracing cloth and paper	96 94	
Books, maps and stationery	225 06	
Street car tickets	120 00	
Stamps	10 00	
Express and freight	8 56	
Paint, oil, etc	15 08	
Telephone	78 06	
Bicycle repairs	3 25	
Fittings and guages	37 09	
Lumber	17 64	
Sounding supplies, tools, etc	16 21	
Miscellaneous	100 68	
		$ 11,657 08
Pumping Works Account.—		
Superintendent, labor, grounds proper	$ 4,633 82	
Paint, oil, etc., grounds	22 51	
Painting tower and closet repairs	100 09	
Bushings, fittings, etc., tools, etc	104 72	
Grass seed	17 82	
Miscellaneous	7 21	
Labor	23 84	
Superintendent, foremen and laborers	36,622 49	
Inspection	1,517 00	
Gates	11,566 00	
On contract new building	49,450 00	
Spier & Rohns, architects	1,750 00	
E. P. Allis, engine contract	5,875 00	
Building coffer dam, new	365 50	
Iron pipe	601 92	
Special castings	1,754 52	
Cement and sand	7,446 80	
Brick	3,824 86	
Repairs to roof	54 72	
Hawley down draft furnace	800 00	
Car tickets	85 00	

Lumber	$ 5,961 30	
Crushed stone and crock	125 22	
Beams, pipe, bolts, nuts, washers, etc., nails and fittings	1,225 50	
Rope, oakum, packing and rubber	313 05	
Use of windlass, cost of hoisting engine, jacks	866 60	
Nails, iron and hardware	100 21	
Wood plugs	5 60	
Freight and telegrams	65 02	
Horseshoeing	43 25	
Shavings	9 00	
Tools and repairs	167 64	
Pump and repairs to pump and boiler, and new boiler	1,404 38	
Rubber boots	59 78	
Miscellaneous	146 76	
Screen, etc., intake and repairs	2,043 93	
Oil and gasoline	86 15	
Paint and glass, etc	32 88	
Crane contract, balance	150 00	
Building dock	3,425 00	
Pillow block	480 00	
Coal	4 50	
Electric light fixtures	113 56	
Teaming	210 75	
Use of steam launch for soundings	112 50	
		$143,776 40

Iron Pipe, Horse Expense Account.—

Shoeing	$ 215 73	
Oats, hay, etc	996 18	
Drugs	32 27	
Bedding	56 75	
Barn tools	54 34	
Purchase office horse, iron pipe horse	420 00	
		$ 1,775 27

Woodmere Account.—

Pay rolls	$ 1,132 10	
Pig lead	4,581 18	
Iron pipe	7,930 82	
Car fare	5 00	
		$ 13,649 10

Hamtrack Account.—		
Pig lead	$ 5,201 44	
Iron pipe	1,023 06	
Teaming	61 40	
		$ 6,285 90
		$450,639 91
Hurlbut Fund Account.—		
Library pay roll	$ 945 00	
Labor pay rolls	3,081 31	
Repairs library, furniture and fixtures, Hurlbut memorial	217 24	
Books and stationery	11 65	
Seed, etc., flowers	28 63	
Glass, paint and oil	19 33	
Hardware, cups, etc., tools	19 39	
Towel supply	4 50	
Miscellaneous	9 08	
Baskets and pots	9 44	
Freight and express charges	59	
Horseshoeing	4 00	
Lumber	19 33	
		$ 4,369 49
Interest	$ 59,573 62	
		$ 59,573 62
Bonded indebtedness	$ 4,000 00	
		$ 4,000 00

RECAPITULATION OF EXPENDITURES FOR OPERATION, MAINTENANCE AND CONSTRUCTION.

For Operation and Maintenance.—		
Office account	$ 27,401 78	
Inspection	6,659 95	
Percentage	5,837 09	
Pumping water	55,950 79	
Repairing leaks	8,279 89	
Meter repairs and expenses	1,524 16	
Service connections	14,246 47	
Office furniture and fixtures	111 05	
Horse, wagon and harness	459 13	
Real estate revenue and expense	3,162 55	
Service cocks, horse expense	662 83	
Repairing leaks, horse expense	663 75	
		$124,959 44

For Construction.—

Extension account	$263,353 69	
Meter account	10,142 47	
Engineering account	11,657 08	
Pumping works account	143,776 40	
Horse expense account	1,775 27	
Village of Woodmere	13,649 10	
Village of Hamtramck	6,285 90	
		$450,639 91

GENERAL RECAPITULATION OF EXPENDITURES.

Total operation and maintenance	$124,959 44
Total construction	450,639 91
Total Hurlbut fund	4,369 49
Total interest account	59,573 62
Total bonded indebtedness	4,000 00
Total expenditures	$643,542 46

The total receipts of the Receiving Clerk from July 1, 1901, to July 1, 1902, were as follows:

July	$ 95,494 68	
August	62,909 55	
September	17,839 60	
October	72,498 97	
November	17,078 35	
December	13,937 99	
January	78,042 87	
February	9,673 94	
March	15,221 91	
April	141,720 45	
May	89,798 45	
June	16,819 64	
	$631,036 40	
Cash on hand June 30, 1901	2,385 51	
		$633,421 91

With bank deposits as follows:

July	$ 91,414 93
August	68,239 44
September	14,729 26

October	$ 70,659 16	
November	21,979 59	
December	12,211 10	
January	77,446 83	
February	12,126 03	
March	11,832 23	
April	140,816 35	
May	93,962 65	
June	14,457 28	
	$629,874 85	
Cash on hand June 30, 1902	3,547 06	
		$633,421 91

Cash Statement for the Year Ending June 30, 1902.

		Dr.	
Cash on hand June 30th, 1901		$ 2,385 51	
Cash in Bank—			
General Fund Account		172,588 45	
Sinking Fund Account		87,510 32	
Hurlbut Fund Account		1,263 37	
Secretary Fund Account		1,000 00	
		$264,747 65	
Total receipts		631,036 40	
			$895,784 05
		Cr.	
Cash on hand June 30, 1902		$ 3,547 06	
Cash in Bank—			
General Fund	$143,975 14		
Outstanding checks	54 34		
		143,920 80	
Sinking Fund		101,844 78	
Hurlbut Fund		1,928 95	
Secretary Fund Account		1,000 00	
		$252,241 59	
Total disbursements		643,542 46	
			$895,784 05

THE AMERICAN EXCHANGE NATIONAL BANK.

Detroit, July 1, 1902.

Benj. F. Guiney, Secretary Board of Water Commissioners of the City of Detroit, Mich.:

Dear Sir—This is to certify that the amounts of balances in this bank to the credit of the Board of Water Commissioners of the City of Detroit, at the close of business June 30, 1902, were as follows: General Account, $143,975.14; Sinking Fund, $101,844.78; Hurlbut Fund, $1,928.95; Secretary Fund, $1,000.00.

Yours truly,

HAMILTON DEY,
Cashier.

The following table is the report of the assessment for the year commencing July 1, 1902.

ASSESSMENT 1902-1903.

Dist.	WARDS.	FAMILIES.			Increase.	Vacant Tenements.	ASSESSMENT.		
		Supplied.	Not Supplied.	Whole Number.			1902-1903.	Increase.	Transf'rd to Meter Rolls.
1	Ninth.......	6,006	14	6,020	140	142	$18,601 05	$959 30	$403 15
	Fifteenth...	2,163	1	2,164	94	20	9,481 15	689 15	40 80
	Seventeenth	2,515	13	2,528	201	19	11,690 15	1,438 05	51 60
	Totals ...	10,684	28	10,712	435	181	39,772 35	3,086 50	495 55
2	Eleventh ...	4,166	8	4,174	164	5	14,178 00	547 00	109 30
	Thirteenth..	3,573	....	3,573	310	14	12,522 30	633 80	164 90
	Totals ...	7,739	8	7,747	474	19	26,700 30	1,180 80	274 20
3	First.........	3,395	....	3,395	110	55	18,569 80	452 45	259 90
	Seventh	3,703	5	3,708	104	49	11,754 60	229 15	192 00
	Totals....	7,098	5	7,103	214	104	30,324 40	681 60	451 90
4	Third.......	3,954	5	3,959	128	30	14,069 60	940 40	189 10
	Fifth........	4,842	1	4,343	112	45	14,424 50	520 00	269 30
	Totals ...	8,296	6	8,302	240	75	28,494 10	1,460 40	458 40
5	Second	2,557	2	2,559	48	55	16,472 40	1,919 44	143 00
	Sixth........	4,210	1	4,211	72	65	16,461 20	420 10	135 00
	Totals	6,767	3	6,770	120	120	32,933 60	2,339 54	278 00
6	Tenth.......	4,812	2	4,814	1	45	19,171 20	757 00	141 50
	Fourteenth.	3,051	7	3,058	108	23	12,182 15	478 75	162 80
	Totals ...	7,863	9	7,872	109	68	31,353 35	1,235 75	304 30
7	Fourth......	3,686	6	3,692	102	48	17,410 60	898 10	97 60
	Twelfth	3,903	7	3,910	53	64	14,959 60	578 00	65 80
	Totals ...	7,589	13	7,602	155	112	32,370 20	1,476 10	163 40
8	Eighth......	4,147	2	4,149	123	41	17,265 80	552 60	104 10
	Sixteenth...	4,535	32	4,567	573	20	15,955 40	1,776 50	133 90
	Totals ...	8,682	34	8,716	696	61	33,221 20	2,329 10	238 00
	Aggregate	64,718	106	64,824	2,443	740	$255,169 50	$13,789 79	$2,463 75

As shown in this table, July 1, 1902, there were 64,718 families supplied with water. Using the average per family obtained as in previous years, 5.04, the population of the city at that time was 326,178, an increase over July 1, 1901, of 12,292.

The average used was obtained by taking the population as shown by the United States Census of 1860-70-80-90, and 1900, and dividing by the number of families on Assessors' books for those years, as follows:

Years.	Population per census.	No. of families assessed.	Average.
1860............	45,619	8,973	5.08
1870............	79,757	14,717	5.42
1880............	116,340	22,423	5.18
1890............	205,876	42,059	4.80
1900............	285,704	60,524	4.72

Making the general average 5.04.

The following table shows the receipts for water rates during the year, arranged by districts, and giving the amount collected upon each annual assessment:

RECEIPTS OF WATER RATES BY DISTRICTS,

From July 1st, 1901, to June 30th, 1902.

YEARS.	1st District Wards 9, 15 and 17.	2d District, Wards 11 and 13.	3d District, Wards 1 and 7.	4th District, Wards 3 and 5.	5th District, Wards 2 and 6.	6th District, Wards 10 and 14.	7th District, Wards 4 and 12.	8th District, Wards 8 and 16.	Meters.	Total.
1892–93	....	....	....	....	....	....	....	....	....	....
1893–94	....	....	....	....	....	....	....	....	....	....
1894–95	....	....	$1 25	....	....	....	....	....	....	$1 25
1895–96	....	....	....	....	....	....	....	....	....	....
1896–97	$1 00	$3 00	....	....	....	....	....	....	....	4 00
1897–98	3 00	50	1 50	....	....	....	....	$ 75	....	5 75
1898–99	....	....	2 00	....	....	....	$ 50	1 00	....	3 50
1899–00	12 07	4 00	6 17	3 12	7 66	3 00	4 67	....	....	40 69
1900–01	985 04	508 73	920 22	800 78	1,376 52	863 80	1,016 58	840 03	....	7,311 65
1901–02	37,112 08	25,743 24	29,127 67	26,867 07	32,002 73	30,701 38	30,707 57	30,916 01	$122,021 17	365,198 92
Total..	$38,113 19	$26,259 47	$30,058 81	$27,670 97	$33,386 91	$31,568 18	$31,729 27	$31,757 79	$122,021 17	$372,565 76

The amount expended for the Pumping Works to July 1st, 1902, is as follows:

ITEMS.	Previously Expended.	July 1st, 1902.	Total.
Land	$38,331 44	....	$38,331 44
Force Mains	624,058 03	....	624,058 03
Inlet Pipe	99,927 26	$2,043 93	101,971 19
Dock, Basin and Canal Coffer Dam	148,865 51	4,058 35	152,923 86
Conduits and Wells	120,665 13	71,670 13	192,335 26
Engine, Boiler and Coal Houses	245,229 41	51,254 72	296,484 13
Stand Pipe and Tower	31,574 16	100 09	31,674 25
Pump Wells	54,221 56	....	54,221 56
Engines	360,248 87	6,355 00	366,603 87
Boilers	95,751 27	800 00	96,551 27
Engineer's House	8,139 75	....	8,139 75
Sewers	6,666 25	....	6,666 25
Electric Light Plant	2,781 19	....	2,781 19
Inspection	3,061 22	1,725 32	4,786 54
New Gallery	8,249 10	....	8,249 10
Traveling Crane	2,240 00	150 00	2,390 00
Grounds, Fences and Gateway	159,080 08	4,697 99	163,778 07
Library, Greenhouse and Belvedere	34,589 55	111 93	34,701 48
Miscellaneous	17,652 65	808 94	18,461 59
Totals	$2,061,332 43	$143,776 40	$2,205,108 83

Water Works Bonds.

The following table shows the whole history of the bonded indebtedness of the Board, in which it will be seen that the total amount of bonds issued is $1,950,000, of which $921,000 have been redeemed, leaving outstanding $1,029,000.

The $100,000.00 seven per cent. bonds which matured September, 1899, and $100,000.00 seven per cent. bonds which matured February 1st, 1900, were on the latter date refunded at three and one-half per cent.

No. of Issue.	Act of	Issued.	Payable.	Amount.	Rate of Interest.	Redeemed or Refunded	Outstanding.
1st	1853	Aug. 1, 1853	Aug. 1, 1883	$100,000	7cts.	$100,000	....
"	"	" "	Aug. 1, 1878	100,000	7 "	100,000	....
"	"	" "	Aug. 1, 1873	50,000	7 "	50,000	....
2nd	1855	Aug. 1, 1855	Aug. 1, 1890	100,000	7 "	100,000	....
"	"	June 12, 1855	Aug. 1, 1885	100,000	7 "	100,000	....
"	"	" "	Aug. 1, 1880	50,000	7 "	50,000	....
3rd	1857	Aug. 1, 1858	Aug. 1, 1893	150,000	7 "	150,000	....
"	"	Aug. 1, 1867	Aug. 1, 1887	100,000	7 "	100,000	....
* 4th	1869	Feb. 1, 1870	Feb. 1, 1900	100,000	7 "	100,000	....
5th	"	Aug. 1, 1872	Aug. 1, 1902	50,000	7 "	....	50,000
6th	"	Aug. 1, 1873	Aug. 1, 1903	50,000	7 "	....	50,000
"	1873	Feb. 1, 1874	Feb. 1, 1904	50,000	7 "	9,000	41,000
7th	1869	Aug. 1, 1874	Aug. 1, 1904	50,000	7 "	6,000	44,000
"	1873	" "	" "	200,000	7 "	3,000	199,000
"	"	June 1, 1875	June 1, 1905	150,000	7 "	1,000	149,000
"	"	June 1, 1876	June 1, 1906	200,000	6 "	2,000	198,000
* "	"	Sept. 1, 1880	Sept. 1, 1899	100,000	4 "	100,000	....
"	"	April 1, 1881	April 1, 1897	100,000	4 "	100,000	....
"	"	Dec. 1, 1881	Dec. 1, 1896	50,000	4 "	50,000	....
"	"	Jan. 10, 1895	Jan. 10, 1925	100,000	4 "	....	100,000
*Refund	1869 1873	Feb. 1, 1900	Feb. 1, 1930	200.000	3½"	....	200,000
				$2,150,000		$1,121,000	$1,029,000

Estimated Valuation of the Works.

Real estate	$ 441,671	75
Buildings, docks, basins, conduits, engines, etc., at pumping station	1,939,346	08
Water pipe in use	4,010,029	97
Meters in use	103,878	87
Office furniture and fixtures	16,000	00
Tools and materials on hand:		
In office of Supt. of Construction	275	00
In office of Civil Engineer	21,459	73
In Inspection Department	172	50
In Meter Department	2,937	80
In Pumping Works Department	17,849	53
In Hurlbut Fund Department	1,873	70
At storage yards	55,841	36
Total	$6,611,336	29

All of which is respectfully submitted.

BENJ. F. GUINEY,

Secretary.

REPORT OF THE GENERAL MANAGER.

Detroit, July 1, 1902.

To the Board of Water Commissioners of the City of Detroit:

Gentlemen—I respectfully submit a report of the general operations of the Works for the year ending July 1, 1902.

The assessment rolls of water rates show a gain in assessments for the year from July 1, 1901, to July 1, 1902, over the preceding, of $13,789.79. No change of rates was made during the year.

The increase of families over the preceding year was 2,443.

A reference to the assessment tables in the report of the Secretary shows in detail the number of families assessed in each ward and district, vacant tenements, the number of families unsupplied and increase of assessments.

The amount received for metered water was the sum of $122,021.17, of which amount the Village of Delray paid $5,704.68, the Village of Highland Park $710.89, and the Village of River Rouge $506.40.

The total number of gallons of water pumped for the year was 18,333,104,706, of which 126,580,300 gallons were supplied to the Village of Delray, 15,607,768 gallons were supplied to the Village of Highland Park, and 11,075,636 gallons to the Village of River Rouge. Meters are placed on the mains at the city line between these villages, and the city receives double the city rate for all water supplied.

The average daily consumption of water was 50,200,204 gallons. The highest daily consumption was 70,873,360 gallons on February 4, and the lowest was 35,109,602 gallons on November 24.

More attention was given during the year than for the last few years to the matter of house to house inspection, with favorable results. There is a large amount of waste due to the use of non-self closing faucets on wash hand-basins and on sinks in stores, shops and factories. It would be a great hardship to compel the changing of these faucets on buildings already supplied, but I would recommend that an amendment be considered to the regulations requiring in future plumbing work the use of self-closing faucets on all wash hand-basins and on sinks as above mentioned.

Storage Grounds.

The Storage Grounds have been improved during the year by the completion of the pattern and tool house and the valuable patterns belonging to the Board are now safely stored therein. A blacksmith and carpenter shop is being erected and a brick shelter shed for the protection of the flushing wagon will be immediately erected. A contract for the erection of a 10-ton wagon scale has been let, for which there has been a great need and will prove of great value. The pipe platforms need immediate rebuilding and a shelter should be provided for the special castings.

I recommend that a brick wall be built on the north side of the grounds, at least eight feet high, extending from the west line to the new blacksmith building, the back of which would be an extension of this wall. But a narrow alley separates the old board fence and frame buildings on this north line from the many sheds and barns on the further side of the alley and this brick wall would furnish needed fire protection as well as other protection to the grounds.

Pumping Works.

The addition to the engine house has not progressed as rapidly as expected owing to the difficulty in obtaining materials. It is, however, nearing completion. The work on the erection of the two twenty-five million triple expansion engines has also been delayed for the same reason. In fact, work in all the construction departments has been much retarded owing to the absolute impossibility of obtaining necessary supplies.

A contract has been let for relaying the stone flooring in the old part of the engine house, and the work is now progressing.

The conduit system, conducting the water from the settling basin to the pumps, has been thoroughly overhauled and repaired, and additional connections and wells constructed. Two new conduits have been built in connection therewith. The old seven-foot intake along the east line was found in bad condition and required considerable repairs. The system is now so arranged that the flow from any intake may be used to supply any of the pumps. A steam pump has been placed in one of the wells and so connected that any of the wells may be pumped out and cleaned at any time. Work on the 10-foot tunnel is progressing favorably.

Electric light wires were extended to the park at the expense of the Board and a complete incandescent lighting system installed in the buildings. The lighting is now being done by the Public Lighting Commission. One of the old dynamos, formerly used in lighting the plant, has been repaired and is in condition for use in case of emergency.

The lavatories in the Hurlbut Memorial Gate had been much damaged by frost and the marble work required considerable repairing, which was done.

The east and west lakes, by their depth, were dangerous to children skating thereon during the season, and have been filled to a level of five feet.

The drainage system has been completed and a large amount of sodding and grading has been done. The grounds, with the necessary exception of the portion occupied with the work of extension of the new mains, are in first-class condition and attract most favorable comment from the many thousand visitors.

The Hurlbut Memorial Library continues to prove of great convenience to the people living in the eastern part of the city. Public library books were circulated from there during the year as follows: July, 1901, 440; August, 420; September, 388; October, 500; November, 525; December, 549; January, 1902, 165; February, 239; March, 375; April, 520; May, 673; June, 533.

Reference books were used in the library as follows: July, 1901, 270; August, 305; September, 325; October, 497; November, 740; December, 538; January, 1902, 164; February, 234; March, 182; April, 330; May, 173; June, 157.

The following table shows the quantity of water pumped each year from 1852 to 1902:

YEARS.	FAMILIES SUPPLIED.	WATER PUMPED.	
		TOTAL QUANTITY.	PER FAMILY.
1852	......	235,840,275	......
1853	4,283	303,531,743	70,868
1854	4,619	376,265,126	81,460
1855	5,282	542,807,364	102,765
1856	5,706	692,124,305	121,297
1857	6,189	697,190,523	112,650
1858	6,474	718,091,207	110,919
1859	6,794	782,112,587	115,118
1860	6,750	870,036.451	125,185
1861	7,128	895,129,423	125,579
1862	7,275	994,945,329	136,762
1863	7,699	1,035,798,043	134,534
1864	7,993	1,019,390,256	127,410
1865	8,351	1,040.514,887	125,675
1866	9,089	1,196,317,922	131,622
1867	10,242	1,425,535,230	139,186
1868	11,544	1,666,545,125	144,364
1869	12,774	1,946,810,325	152,400
1870	13,722	1,866,060,068	136,000
1871	14,896	2,300,150,605	154,414
1872	16,035	2,782,292,578	173,513
1873	17,019	3,198,393,948	187,930
1874	18,853	3,289,872.635	174,511
1875	19,606	4,207,454,260	214,600
1876	20,102	4,065,134,470	200,225
1877	20,345	4,213,239,790	207,090
1878	20,603	4,345,743 330	210,927
1879	21,341	5.129,599,110	240,348
1880	22,465	5,552.965,310	247,183
1881	23,749	6,543,127,968	279.722
1882	25,442	6,284,000,742	243,062
1883	27,415	7,379,327,788	269,170
1884	29,424	8,510,614,140	289.260
1885	30,533	9,970,829,580	326,886
1886	31,946	10,576,571,254	331,070
1887	34,486	13,168,859,808	381,860
1888	36,863	14,380,166,670	390,098
1889	39,158	12,875,334,453	328,880
1890	41,467	12,120,944,532	292,300
1891	43,933	12,057,261,236	274,470
1892	46,400	12,276,612,482	264,582
1893	49,817	13,877.977,208	278,579
1894	49,912	13,649,779,605	273,476
1895	51,426	14,698,451,954	285,818
1896	53,941	13,254,369.371	245,719
1897	54,945	12,928,821,326	235,305
1898	56,341	14,278,682,058	253,433
1899	58,931	16,348,062,701	277,410
1900	60,524	17,077,100,477	282,154
July, 1901 to July, 1902	64,718	18,333,104,706	283,320

Pipeage System.

You are respectfully referred to the report of the Superintendent of Construction for details of the work done in this department during the year.

The mains have been thoroughly flushed during this period, and the dead ends blown off at least twice each month. All gates have been systematically examined and repairs made where necessary. It has been the policy during the year in making new extensions to avoid creating dead ends wherever possible, and to cure those already existing. It is strongly recommended that this plan be followed in the future.

But one serious break occurred in the system, that being December 20, 1901, on the 42-inch main, at the corner of Jefferson and McClellan.

The total mileage of the distribution system July 1st, 1902, was 581 miles and 2,972 feet. Ten miles and 180 feet were laid during the year, 1,565 feet of which were laid in the Village of Delray, the said village paying the cost thereof.

Contracts were entered into with the Villages of Woodmere and Hamtramck for extension of the system in those villages, they depositing the sum of $88,500 and $70,082.61, respectively, to cover the estimated cost of the extensions. Delay in obtaining materials and the unusual wet season have prevented the commencement until the present time.

Data Detroit Water Works, July 1, 1901, to July 1, 1902.

System of water works: Direct pressure. No reservoir.

Source of supply: Detroit River.

Number of pumping stations: One.

Type of pumps: One 30,000,000 Comp. Beam; two 24,000,000 Comp. Beam; one 24,000,000 triple Allis. Total daily capacity 102,000,000.

Area of city: 29 square miles.

Population: (See Secretary's report), 326,703.

Pumpage: 18,333,104,706 gallons.

Consumption, gallons, unmetered: 13,958,881,490.

Consumption, gallons, metered: 4,374,223,216.

Average daily consumption: 50,200,204 gallons.

Consumption, per capita (city): 153 gallons.

Revenue, unmetered water: $250,544.59.

Revenue, metered water: $122,021.17.

Revenue, per 1,000 gallons metered water: .027.

Revenue, per 1,000 gallons unmetered water: .018.

Number of meters: 5,738.

Kind of coal used: Bituminous, run of mine.

Price, per ton: $2.31 in sheds.

Total cost of fuel consumed (including heat and light of library and greenhouse), $24,830.79.

Average head against pumps in feet: 115.

Number of miles mains: 581.

Number of fire hydrants: 3,613.

Service taps: 59,225.

Gates: 7,016.

City Water Supply.

The following is the report from the Board of Health of the analysis of the water supply for the month of June, 1902:

	Parts per million.
Appearance—Nearly clear.	
Total solids	112.0
Volatile matter	40.0
Non-volatile matter	72.0
Free ammonia	.020
Albuminoid ammonia	.118
Nitrogen as nitrates	.165
Nitrogen as nitrites	.000
Chlorine	2.70
Oxygen absorbed in 15 minutes	.28
Oxygen absorbed in 4 hours	.88
Bacteria per cubic centimeter:	
June 7th, '02	.398
June 10th, '02	.34
June 11th, '02	.140
June 12th, '02	.69
Growth in .2 per cent. carbo-gelatine	none

Conclusion: Water is in good condition.

W. I. TIBBALS,
Chemist and Bacteriologist.

All of which is respectfully sumbitted.

H. S. STARKEY,
General Manager.

REPORT OF THE CIVIL ENGINEER.

Detroit, Mich., July 25, 1902.

To the Board of Water Commissioners of the City of Detroit:

I have the honor to submit the report of the Civil Engineer for the year ending June 30, 1902.

Distribution.

The line of 42-inch pipe in Hurlbut and Sylvester from Jefferson avenue to East Boulevard, has been completed.

The 36-inch pipe line on Sylvester, Mt. Elliott and Superior has been completed from East Boulevard to Gratiot avenue. In addition to the foundry test, which was very severe, these lines have all been tested to a pressure of 125 to 140 pounds per square inch, in the open trench. The test pressure was maintained at least four hours and sometimes from twelve to twenty-four hours.

Numerous sand or pin holes were found, which could usually be drawn or rusted tight. Very few leaking joints were found; not more than six or seven required re-caulking out of about 1,560 joints tested. One 42-inch joint ⅝ inches thick by 2¾ inches deep, pushed out at a pressure of 140 lbs., and one 42-inch pipe 1½ inches thick split at the spigot end under test. This pipe had previously stood 300 pounds at the foundry, and as the metal was good it was probably cracked in transit. Several lengths of 42-inch pipe were broken in handling during the severe cold weather. The 42-

inch and 36-inch pipe is laid to true line and grade, which is either level, or ascending in the direction of flow.

All details of cost are given in the reports of other officers.

It is expected that the balance of the 36-inch pipe and the 42-inch connections at the pumping station will be completed and ready for use by the time the two 25 million Allis pumps are ready to run.

Three new villages have applied for water.

Woodmere.

The Village of Woodmere lies on low sandy ground, west of the city and north of Delray. It contains two and one-third square miles. The population was 4,400 in May, 1901, when a census was taken for the purpose of incorporating. At that time there were 894 dwellings and 84 stores and shops incident thereto. There are no sewers and no large manufacturing plants. The total assessed valuation is slightly above two million dollars.

Contracts have been let for material, and the work of laying pipe begun. The system will at present cover built-up streets only, but is designed for a future population of 12,000. There will be 22¼ miles of pipe, with accessory gates, hydrants, wells, etc.

The estimated cost is $86,612. The estimate is likely to be exceeded on account of the unusual rainfall and ground water encountered this season.

Hamtramck.

The Village of Hamtramck, which joins the city on the northeast, has a population of 2,600, and an area of about two and one-half square miles. The plants of the Acme White Lead and Color Works, American Radiator Co., Detroit Carriage Co., and Russell Wheel and Foundry Co., are included within the village. These four plants are already supplied with city water by meter, and use an average of 150 gallons per minute during working hours.

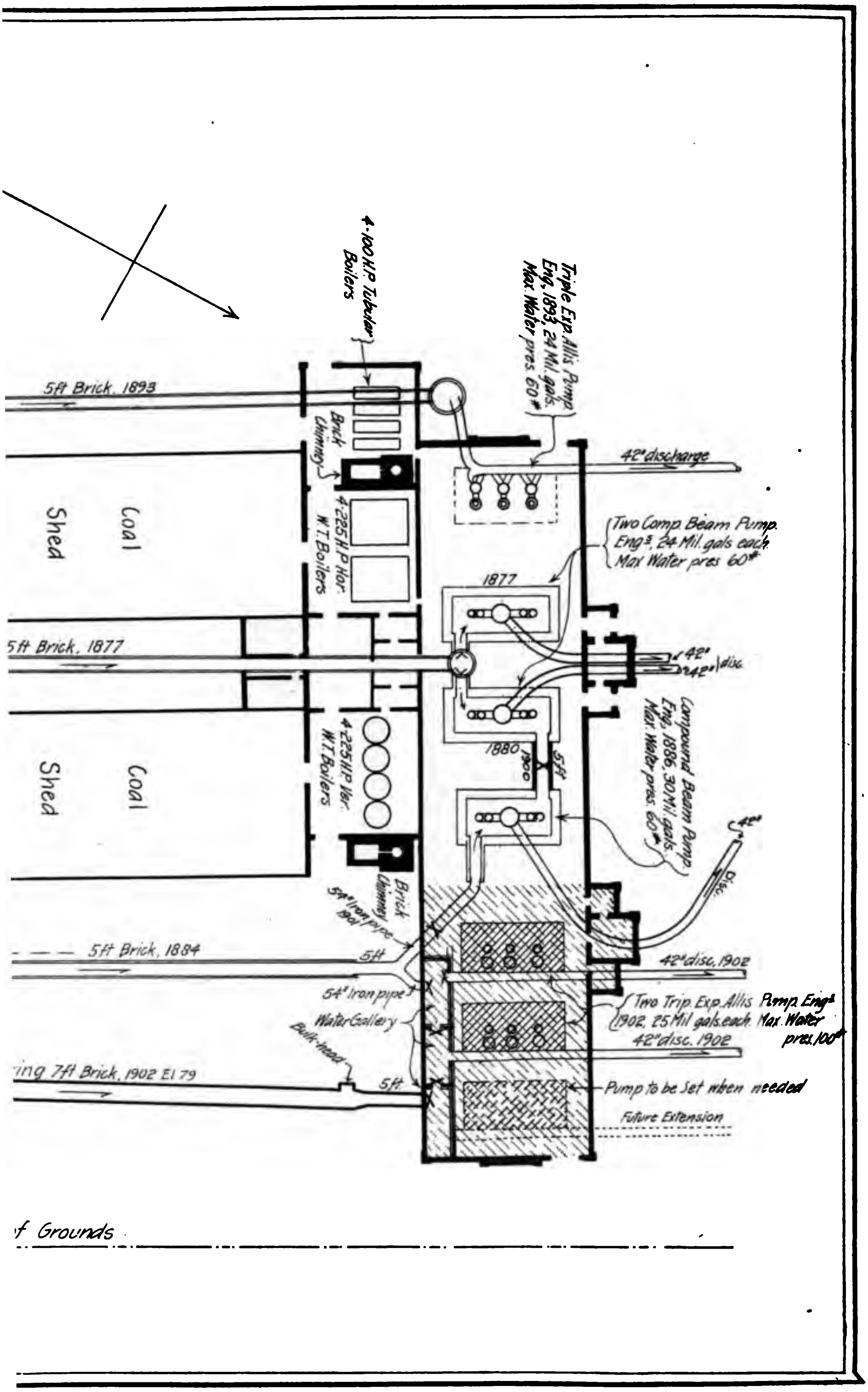
Contracts have been let for material, but work has not yet begun on the system. There will be a trifle over fifteen miles of pipe, with accessories, at an estimated total cost of $70,082.61.

Grosse Pointe,

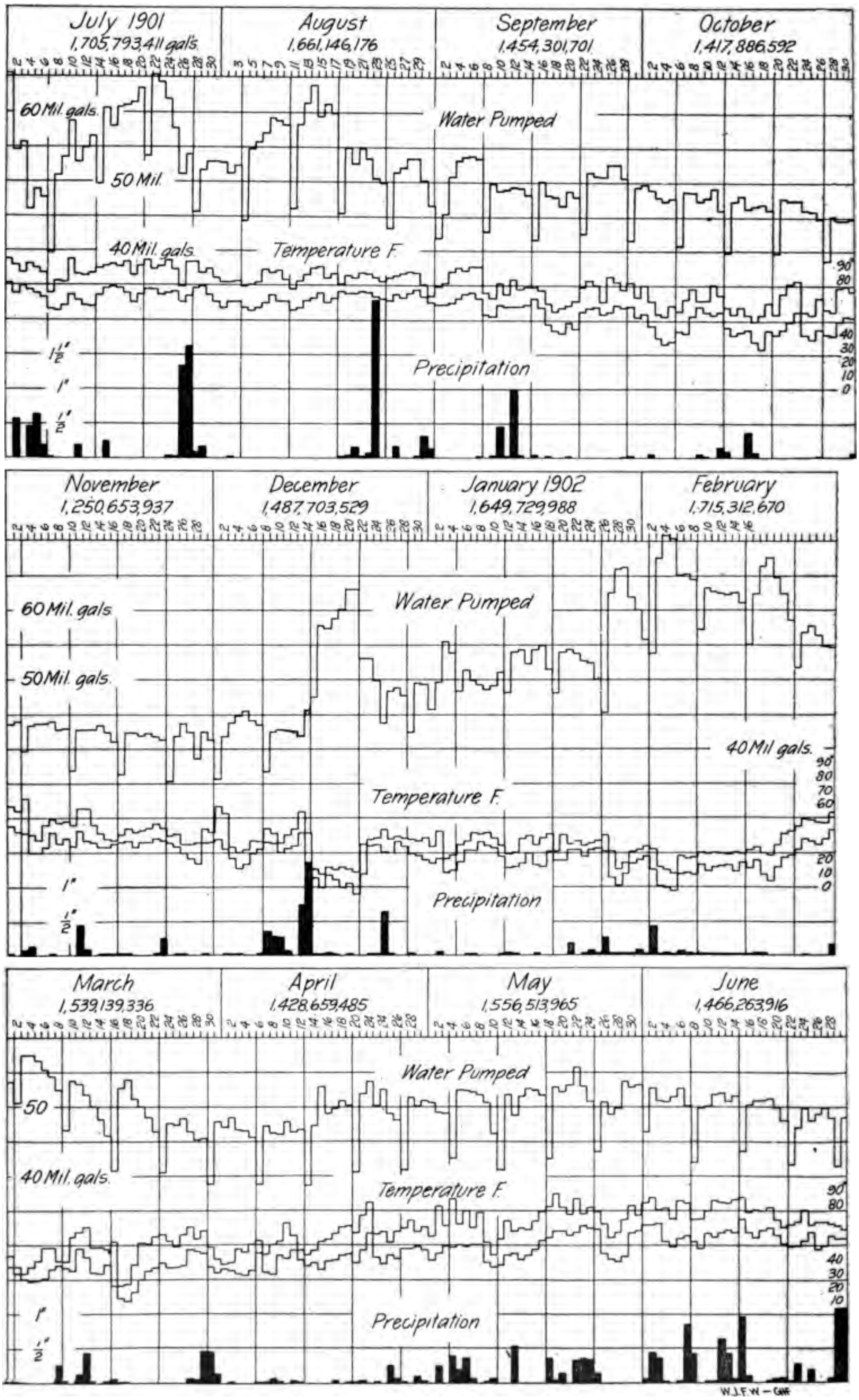
The Village of Grosse Pointe is made up of residence property fronting on Jefferson avenue and Lake St. Clair. It lies directly west of the Village of Grosse Pointe Farms, and is separated from the City of Detroit by nearly four miles of intervening property. The village, not satisfied with its present supply on account of poor service and high rates, has petitioned the Board to extend to them the advantages of a supply from the city plant. There is no engineering difficulty in the way of making the extension, which would cost about $30,500. The Board, however, has not yet taken definite action in the matter.

Conduits.

The system of completed conduits, wells and basin outlets in the rear of the pumping station, is shown on plate No. 1. It is so arranged that almost any combination of pumps and conduits can be made. This work has been done by day labor at an economical cost when its magnitude is considered, as shown in the report of the Superintendent of Construction. Work is now in progress on the 10-foot land tunnel extending to the river along the east side of the Settling Basin. Two hundred and ninety-one feet and six inches has already been completed. Borings show that about


5ft Brick, 1893
4-100 H.P. Tubular Boilers
Triple Exp. Allis Pump Eng. 1893, 24 Mil. gals. Max. Water pres. 60#
Brick Chimney
4-225 H.P. Hor. W.T. Boilers
42" discharge
Coal
Shed
Two Comp. Beam Pump Engs. 24 Mil. gals each Max Water pres 60#
1877
5ft Brick, 1877
42"
42" disc.
4-225 H.P. Ver. W.T. Boilers
Coal
Shed
1880
1900
5ft
Compound Beam Pump Eng. 1886, 30 Mil. gals. Max Water pres. 60#
42"
Disc.
Brick Chimney
54" Iron pipe 1901
5ft Brick, 1884
5ft
42" disc. 1902
54" Iron pipe
Water Gallery
Bulk-head
Two Trip. Exp. Allis Pump Engs. 1902, 25 Mil gals each. Max. Water pres. 100#
42" disc. 1902
ing 7ft Brick, 1902 El 79
5ft
Pump to be Set when needed
Future Extension
f Grounds

Daily Water Temperature and Precipitation 1901-2



400 feet of this tunnel will have to be built in open trench with heavy sheet piling, on account of pockets of wet sand, which cannot be tunneled without a special plant.

Water Used.

The water used each day is shown on Plate No. 2. The largest day was on February 4th, when the pumps registered 70,873,360 gallons. The maximum hour, however, occurred on July 1st, when the consumption between 7 and 8 p. m. reached 3,711,330 gallons, a rate of over 89 million gallons per day. The heavy rains and moderate temperature this season have thus far prevented the summer consumption from reaching a high point.

The daily use of water per person actually supplied is given, for the city and villages, in the following table:

	TOTAL GALLONS PUMPED.		Estimated Number* Persons Supplied.	Gallons per Consumer.
	Year.	Daily Average.		
Detroit, unmetered......	13,958,881,490	49,807,784	304,943	163.3
Detroit, metered........	4,220,959.512			
Delray, metered.	126,580,300	346,795	3,810	91.0
River Rouge, metered...	11,075 636	30,344	1,335	22.7
Highland Park, metered.	15,607,768	42,761	539	79.3
Total...............	18,333,104,706	50,227.684	310,627	161.7

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*Number of families supplied, multiplied by 4.715, rate of U. S. Census 1900. See Report 1901, p. 44.

Pressures.

Hourly gauge readings have been taken as usual at thirty locations. The condensed results are given in the following table:

	LOCATION OF GAUGES.	Elevation gauges. City datum 0=480.30 sea level.	Elevat'n pounds above surface pump wells 92.00, at which engine gauges are set.	AVERAGE DAILY GALLONS 47,183,834 July 1, 1900, to June 30, 1901.				AVERAGE DAILY GALLONS 50,227,684 July 1, 1901, to June 30, 1902.				INCREASE OR DECREASE FRICTION DURING LAST YEAR.		MAXIMUM HOUR OBSERVED, July 1, 1901, 3,711,330 gals, 7 to 8 P. M. Daily Rate 89,071,920 gals.	
				PRESSURE, POUNDS.				PRESSURE, POUNDS.				POUNDS.			
				High	Low.	8760 Readings Average.	Fric. Loss, Lbs.	High	Low.	8760 Readings Average.	Fric. Loss, Lbs.	Inc.	Dec.	Average Pressure Lbs.	Fric. Loss.
	Pumping Station	92.00	....	60	40	50.32	....	60	41	50.59	....	....	....	57.79	....
Low Service	*Eng. No. 26, Crane and Brinkett	125 787	14.62	41	29	34.61	1.09	43	26	34.58	1.39	0.30	....	39.00	4.17
	†Eng. No. 7, Concord near Jefferson	124.773	14.19	42	28	33.45	2 68	41	28	34.36	2.04	....	0.64	36.00	7.60
	Truck No. 6, Elmwood and Fort	124.495	14.07	•36	23	30.13	6.12	35	25	30.06	6.46	0.34	....	31.50	12.22
	Eng. No 2, Hastings nr. Congress	120 981	12.55	37	26	31.00	6.77	37	24	30.75	7.29	0.52	....	30.00	15.24
	Water Office, Randolph and Jefferson	125.176	14.36	34	22	27.71	8.25	33	22	27.88	8 35	0.10	....	27.50	15.93
	Truck No. 1, Wayne and Larned	116.738	10.71	38	25	31.28	8.33	35	24	31.42	8.46	0.13	....	30.50	16.58
	Eng. No. 3, Griswold and Clifford.	123.059	13.44	34	23	29.30	7.58	35	24	29.57	7.58	0.00	....	28.00	16.35
	Eng. No. 8, Sixth and Baker	121.072	12 58	35	22	29.00	8.74	37	24	29.32	8.69	....	0.05	26.50	18.71
	Eng. No. 4, Eighteenth nr. Howard	116.179	10.46	33	19	27.60	12 26	34	21	27.61	12.52	0.26	....	20.00	27.33
	Truck No. 4, Twentieth nr. Rose	124 825	14.21	31	16	24.43	11.68	32	16	24.58.	11.80	0.12	....	16.00	27.58
	Eng. No. 10, Sixteenth and Bagg.	125.282	14.41	32	16	25.95	9.96	34	19	26.37	9.81	....	0.15	19.00	24.38
	Eng. No. 15, Hubbard near Fort	114.977	9.95	34	16	27.25	13.12	35	15	26.88	13.76	0.64	....	15.00	32.84
	‡Delray, Solvay Process Co. Works.	113.360	8.38	....	....	....	....	36	18	28.53	13.68	....	....	....	....
	Eng. No. 14, Scotten nr. Michigan.	121.369	12.71	34	17	27.78	9.83	37	16	27.52	10.36	0.53	....	17.00	28.08
	Eng. No. 22, Michigan near Hammond.	119.444	11.88	34	16	26.51	11 93	35	16	26.46	12.25	0.32	....	16.00	27.88
	Truck No. 10, Sheridan and Mack.	140.254	20.89	35	19	27.60	1.83	35	20	27.46	2.24	0.41	....	30.50	6.40
	Eng. No. 18, Mt. Elliott nr. Sylvester	146.270	23.49	33	18	25.28	1.55	33	18	25.43	1.67	0.12	....	27.50	6 80
	Eng. No. 11, Grandy and Gratiot	143.211	22.17	28	15	21 70	6 45	28	16	22.04	6.38	....	0.07	20.50	15.12
	Eng. No. 6, Russell and High	144.845	22.88	25	12	19 58	7.86	25	14	19.78	7.93	0.07	....	19.50	15.41
	Storage Yd. Erskine nr. Riopelle.	150.635	25.38	24	12	17.17	7.77	22	13	17.53	7.68	....	0.09	15.50	16.91
	Truck No. 5, Russell and Erskine.	147.742	24.13	25	13	18 12	8.07	25	10	18 59	7 87	....	0.20	16.00	17.66
	Eng. No. 5, Alexandrine nr. Cass.	146 693	23 68	23	12	18.42	8 22	24	11	18.37	8 54	0.32	....	14 50	19.61
	Eng. No. 12, Sixteenth and Grd. River	141.546	21.45	24	10	17.31	11.56	24	10	17.51	11.63	0.07	....	12.50	23 84
	Eng. No. 20, Baldwin and Gratiot.	145.368	23 10	33	19	25.24	1.98	34	16	25.68	1.81	....	0.17	28.00	6.69
High Service§	Eng. No. 23, Moran and Boulevard	154.288	26 96	27	13	19.57	3.79	28	12	19.69	3.94	0.15	....	19 50	11.33
	Eng. No. 13, Russell and Ferry	157.304	28.27	26	11	18.05	4.00	25	11	18.09	4.23	0.23	....	16.00	13.52
	Eng. No. 17, Cass and Amsterdam	152.825	26.33	26	13	18.99	5.00	26	11	19.41	4.85	....	0.15	17.00	14.46
	Eng. No. 21, Lincoln nr. Piquette.	154.880	27.22	27	9	19.89	3 21	27	12	20 02	3.35	0 14	....	16.00	14.57
	Eng. No. 24, Mott nr. Woodward.	155.855	27.64	25	13	18.20	4.48	26	11	18.39	4 56	0.08	....	17.50	12.65

* The Gauge at Engine House No. 26, set and readings commenced June 12, 1901.

† The Gauge at Engine House No. 7, out of service from July 10th to Oct. 31st, 1900, account of repairs to House.

‡ The Gauge at Delray was set and readings commenced Aug. 22, 1902.

§ Division of the system completed Dec. 6th, 1900.

Attention is called particularly to the last two columns, which give the pressure and frictional loss during the hour of greatest consumption. The low pressures and high frictional losses recorded by those gauges located in the southwestern portion of the city emphasize the need of an additional main to relieve that section. It is urged that the proposed line of pipe from Sixth street to Vinewood avenue be authorized this season.

Ice.

In August the Board authorized the construction of an emergency valve. It was built and attached to the 72-inch intake pipe nearest the pier late in the fall. The pier was also extended to afford protection and a place from which to operate the valve. The wisdom of this move was shown during the following winter, which proved an open one, and therefore particularly bad for the formation of ice on the cribs. The usual protective covering of surface ice failed to form and on January 4th and again on the 13th, the flow of water through all three intake pipes was entirely cut off by the accumulation of ice on the outer submerged cribs. In each case the difficulty lasted from about midnight until ten or eleven o'clock in the forenoon. During this period the only water entering the Settling Basin came through the emergency valve. It was necessary to operate the valve at intervals of about twenty minutes in order to clear it of needle ice, which collected in large quantities. The supply procured in this manner, while not enough, was sufficient to keep the pumps running slowly and prevented the plant from shutting down altogether. The city was on short supply and considerable inconvenience was caused by the low pressure. No serious damage resulted, however. The emergency valve paid for itself many times over during those anxious hours. On the 13th the old emergency intake, which had been abandoned for several years, was re-excavated and brought into service. With these two in a condition to be used, it is not likely that a short supply will again occur.

Inspection.

The inspection of material in the shops and foundries has been very thorough. Valves, hydrants, cocks, iron pipe and special castings, have been examined piece by piece with the greatest care and fidelity. Good work has been uniformly insisted upon, and the requirements of the specifications upheld, frequently under trying circumstances. Nevertheless the good will and co-operation of the manufacturers on the whole has been pleasantly maintained and much appreciated.

The inspection of cast iron pipe at the foundry has been unusually severe. Each length of pipe has been tested to 300 lbs. pressure, which in the case of 36-inch and 42-inch pipe was frequently maintained for a period of 15 minutes. The quality of iron has also been kept up to standard requirements. During the year hundreds of tons of pipe have been rejected.

Drafting Room.

The major portion of the work of the Engineering Department is, of course, done in and through the Drafting Room. It is there that all work is designed and laid out, and the necessary drawings and estimates made. The work connected with field records, extensions, petitions, posting drawings, and filing records is largely of a routine nature, much the same from year to year. Literally thousands of sketches, plans and blue prints are required and furnished. All of these details have been kept well in hand by the Chief Draftsman and other employes in the department.

Very respectfully submitted,

CLARENCE W. HUBBELL,
Civil Engineer.

REPORT OF SUPERINTENDENT OF METERS AND INSPECTION.

Detroit, July 1, 1902.

To the Board of Water Commissioners:

Gentlemen—In compliance with the rules and regulations of your honorable body, I herewith report the work done in the Meter, Inspection and Service Cocks Department from July 1, 1901, to July 1, 1902:

NUMBER OF METERS PLACED FROM JULY 1, 1901, TO JULY 1, 1902.

	SIZES.								
	⅝ in.	¾ in.	1 in.	1½ in.	2 in.	3 in.	4 in.	6 in.	Total
In service July 1, 1901	3,110	1,041	875	254	210	89	46	10	5,635
Placed from July 1, 1901, to July 1, 1902	155	26	73	40	27	11	7	1	340
	3,265	1,067	948	294	237	100	53	11	5,975
Removed from July 1, 1901, to July 1, 1902	150	28	35	11	8	4	1	......	237
Total number in service July 1, 1902	3,115	1,039	913	283	229	96	52	11	5,738

IN SERVICE JUNE 30, 1902.

KIND.	SIZES.								
	⅝ in.	¾ in.	1 in.	1½ in.	2 in.	3 in.	4 in.	6 in.	Total
Thomson	3,072	1,020	842	272	202	82	37	11	5,538
Crown	26	12	35	9	8	7	3	......	100
Hersey	1	3	26	2	10	2	8	......	52
Worthington	8	4	10	......	9	5	2	......	38
Union Rotary	7	......	......	......	......	......	1	......	8
Buffalo	1	......	......	......	......	......	......	......	1
Venturi	......	......	......	......	......	......	1	......	1
Aggregate	3,115	1,039	913	283	229	96	52	11	5,738

Indicators attached to hydraulic elevators	38

METERS IN STOCK.

KIND.	SIZES.							
	⅝ in.	1 in.	1½ in.	2 in.	3 in.	4 in.	6 in.	Total
Thomson	......	3	8	7	2	1	1	22
Crown	......	1	2	3	2	1	......	9
Hersey	......	8	......	2	......	......	......	10
Worthington	......	......	......	1	......	......	......	1
Union Rotary	1	......	......	......	......	......	......	1
Aggregate	1	12	10	13	4	2	1	43

Valuation of meters in stock July 1, 1902		$1,700 00
Valuation of material on hand July 1, 1902		403 83
Valuation of tools, etc., July 1, 1902		458 97
Valuation of horse, wagons, etc., July 1, 1902		270 00
Valuation of furniture, fixtures, etc., July 1, 1902		105 00
Total valuation of stock on hand July 1, 1902		$2,937.80

Valuation of meters in service July 1, 1901		$99,077 75
Deduct 5 per cent. for depreciation in value	$4,953 88	
Deduct for meters sold	261 24	5,215 12
		$93 862 63
Add amount expended during the year for meters placed		4,801 12
Total valuation of meters in service July 1, 1902		$98,663 75

SUMMARY OF TOTAL AMOUNT EXPENDED IN THE METER DEPARTMENT FOR THE YEARS 1889 TO JULY 1, 1902, INCLUSIVE.

	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900-1	1901-2	TOTAL
Meters	$11,175 00	$18,700 00	$6,501 55	$12,371 82	$6,987 43	$8,824 08	$9,235 11	$10,435 76	$7,955 97	$1,790 75	$2,265 70	$4,172 61	$4,801 12	$105,216 90
Supt. and labor,	1,734 10	8,510 57	4,841 49	8,269 17	8,980 46	6,672 20	6,647 89	6,340 08	6,078 78	4,531 11	4,223 54	6,369 45	4,597 96	77,796 82
Material, tools, etc............	637 26	2,982 14	872 99	2,132 98	1,650 33	1,833 01	1,384 85	1,035 15	927 90	568 99	375 32	617 71	521 69	15,540 27
Freight, hauling, etc............	98 05	408 97	197 11	244 08	165 12	201 18	71 40	91 11	67 90	13 16	6 85	15 00	1 60	1,581 53
Horses, wagon, etc............	....	... .	... .	547 24	184 50	383 07	248 60	238 51	330 80	187 50	244 25	321 15	220 10	2,905 72
Aggregate..	$13,644 41	$30,601 68	$12,413 14	$23,565 24	$17,967 86	$17,913 54	$17,587 85	$18,140 61	$15,361 35	$7,091 51	$7,115 66	$11,495 92	$10.142 47	$203,041 24

Three hundred and forty (340) meters were placed during the year and 237 removed, making a net increase of 103, which, added to the number previously in service, makes the total number on July 1st, 1902, 5,738.

There are still 656 meters on premises that pay by estimated rates as against 807 July 1st, 1901, one hundred and fifty-one (151) having been removed and set on business places. Out of the 340 meters placed during the year, 123 were on factories (large and small), 73 saloons, 59 apartment houses, 12 stables, and 11 schools, the balance being office buildings, stores, etc. Sixty premises on which meters still remain, and where said premises were paying by estimated rates, were placed back on the meter roll on account of their large consumption, and it is astonishing how quickly the consumption on such places drops back to the normal quantity when they are obliged to pay by meter instead of estimated rates. They seem to think it no crime to waste public property, but when they have to meet the cost individually, it is immediately reduced to the minimum amount.

When the break in the 42-inch main occurred last winter, we had a number of meters damaged, caused by hot water being siphoned out of boilers while the pressure was off from many of the supply mains. As nearly all of our meters are of the disc type, the cost was only that of the time spent in making repairs, only losing three discs out of the fifty that were damaged.

It may be of interest to know that the discs are made of vulcanized rubber, and if they are subjected to hot water they become soft and warp out of shape, and will not operate.

When we first began the use of meters, it was thought that hot water ruined the discs, but we discovered that by placing them again in hot water until they became softened, and then placing them in a press, they resume their original shape, and can be easily fitted into the disc chamber again, being just as good as ever. Occasionally we find one that cannot be so repaired, but the loss is less than 7 per cent. The discovery has saved us many dollars, as hot water is something that is always liable to get into meters, owing to various causes, such as siphonage, defective check valves, etc., and it is necessary to guard all of the different kinds of meters against it, as the disc or piston is an expensive part of a meter.

Inspection.

The change made by your honorable body in the mode of making the water assessments, that is requiring said assessments to be made by the collectors instead of the inspectors, and the delivering of delinquent notices to be done by the collectors also, relieves the inspectors of a large amount of work, and will enable them to devote much more time in the inspection for leaks, something that is exceedingly necessary, as this part of the work has been neglected in some of the wards, owing to the time required to do the work that is now being done by the collectors.

The following table will show a portion of the work done by the inspectors during the past year:

TABLE showing a portion of the work done by the Inspectors during 1901-2.

New connections examined	2,108
Extensions examined	836
Buildings inspected	4,416
Fixtures inspected	4,617
Let on vacancy and non-payment	975
Let on new connections	1,790
Building tax notices	2,508
Delinquents notified	52,285
Shut off for non-payment	631
Shut off for vacancy	239
Inquiries for collectors	8,977
Meters read	26,606
Meter bills delivered	17,671
Examined for leaks	11,069
Leaks reported	1,338
Shut off for leaks	214
Aggregate	136,275

Service Cocks.

Two thousand one hundred and eight (2,108) service connections were made during the year ending June 30th, 1902, and 120 were discontinued, making the total number of service connections in the city 59,225. There were 136 more connections made during the last year than for the eighteen months previous thereto.

The two outlying wards show the greatest increase, 513 taps having been made in the Sixteenth Ward alone.

TABLE showing the number and sizes of taps inserted in each ward from July 1, 1901, to July 1, 1902.

INSERTED.	WARDS.																	Total.
SIZES.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
⅝-inch	34	8	55	14	73	30	50	48	90	97	76	86	138	117	67	498	192	1,673
1-inch	63	35	29	21	9	18	15	14	13	24	8	13	14	10	29	12	30	357
2-inch	5	13	2	4	1	2	...	1	2	2	...	3	...	1	3	2	6	47
3-inch	2	3	3	...	1	1	...	...	1	...	1	1	3	1	1	...	1	19
4-inch	...	1	1	...	1	1	...	...	1	...	...	...	2	..	1	...	...	8
6-inch	1	1	...	...	...	...	1	...	...	...	...	...	...	...	...	1	...	4
Aggregate	105	61	90	39	85	52	66	63	107	123	85	103	157	129	101	513	229	2,108
DISCONTINUED.																		
⅝-inch	15	14	8	4	3	4	8	3	1	...	8	3	...	17	7	...	5	100
1-inch	5	2	2	2	3	...	2	1	...	...	...	...	...	3	...	...	...	20
Aggregate	20	16	10	6	6	4	10	4	1	...	8	3	...	20	7	...	5	120

TABLE SHOWING THE NUMBER OF SERVICE CONNECTIONS IN USE JULY 1st, 1902.

SIZES.	In Use July 1, 1900.	Added in 1901-2	Discontinued in 1901-2	Total in Use July 1, 1902.
⅝ inch	41,762	1,673	100	43,335
1 "	14,775	357	20	15,112
2 "	339	47	....	386
3 "	191	19	....	210
4 "	138	8	....	146
6 "	31	4	....	35
10 "	1	....	....	1
	57,237	2,108	75	59,225

TABLE SHOWING SERVICE CONNECTIONS IN HIGHLAND PARK, DELRAY AND RIVER ROUGE VILLAGES.

	Inserted in 1901-2.				Previous to 1901-2.						Total.
	⅝-in.	1-in.	2-in.	4-in.	⅝-in.	1-in.	2-in.	3-in.	4-in.	6-in.	
Highland Park	8	7	...	...	39	37	1	1	...	...	93
Delray	23	12	1	...	623	64	3	2	1	4	733
River Rouge	86	2	...	1	130	1	...	...	...	...	220
Aggregate	117	21	1	1	792	102	4	3	1	4	1,046

The service connections and plumbing work in the above named villages is done under the supervision of their own officials, all being governed by the same rules and regulations that govern such work in our city.

Each village is supplied with water through meters, for which a quarterly bill is rendered. The water for River Rouge Village first passes through the Delray meters, and is deducted from the total Delray consumptions. This is made necessary by the River Rouge supply being a continuation of the Delray system.

Attached to this report is a complete list of tools on hand, and an itemized account of material in stock in the meter and inspection departments on the first day of July, 1902.

All of which is respectfully submitted.

T. R. PUTNAM,
Supt. Meters and Inspection.

REPORT OF CHIEF ENGINEER AT PUMPING WORKS.

To the Board of Water Commissioners:

Detroit, July 1, 1902.

Gentlemen — I have the honor to submit the Engineer's report for the year ending June 30, 1902.

The following table shows the number of gallons of water pumped, and cost of fuel for the years named:

YEAR.	GALLONS OF WATER PUMPED.	COST OF FUEL CONSUMED.	AVERAGE DAILY DELIVERED.
1852	235,840,271		646,411
1853	303,531,743	$2,129 37	931,594
1854	376,265,126	2,271 34	1,030,866
1855	542,807,364	3,325 81	1,487,143
1856	692,124,305	4,017 44	1,896,231
1857	697,190,523	3,993 20	1,909,837
1858	718,091,207	3,655 20	1,967,373
1859	782,112,587	3,194 15	2,142,774
1860	870,036,451	4,196 21	2,383,580
1861	895,129,423	4,414 07	2,452,409
1862	994,945,329	3.150 95	2,725,878
1863	1,035,798,043	4,670 86	2,837,803
1864	1,018,390,256	7,647 62	2,839,078
1865	1,049,514,887	7,372 89	2,875,383
1866	1,196,317,922	9,349 16	3,277,583
1867	1,425,535,230	10,121 82	3,905,576
1868	1,666,545,125	11,379 23	4,507,248
1869	1,946,810,325	11,247 92	4,511,809
1870	1,866,060,068	12,713 78	5,112,493
1871	2,300,150,605	14,681 05	6,301,782
1872	2,782,292,578	17,736 86	7,601,892
1873	3,198,393,948	20,233 30	8,762,723
1874	3,289,872,635	20,431 71	9,013,350
1875	4,207,454,260	21,393 98	11,527,272
1876	4,065,134,470	19,832 89	11,107,499
1877	4,213,239,790	17,433 72	11,543,123
1878	4,345,743,330	10,943 82	11,906,146
1879	5,129,599,110	11,219 51	14,053,696
1880	5,552,965,310	12,276 60	15,172,036
1881	6,543,127,968	16,556 63	17,926,877
1882	6,284,000,742	18,156 16	17,261,440
1883	7,379,327,188	16,495 99	20,217,334
1884	8,510,614,140	19,877 07	23,253,044
1885	9,970,829,580	21,341 48	27,317,341
1886	10,576,571,254	20,387 24	28,976,907
1887	13,168,859,808	35,882 83	36,079,166
1888	14,380,166,670	39,568 66	39,397,716
1889	12,875,334,453	34,413 31	35,274,888
1890	12,120,944,532	31,852 40	33,209,067
1891	12,057,261,236	33,826 86	33,033,592
1892	12,476,612,482	31,034 40	34,182,499
1893	13,877,977,208	27,479 93	38,021,855
1894	13,649,779,605	29,283 47	37,396,656
1895	14,698,451,954	32,095 00	40,269,731
1896	13,254,369,371	31,186 17	36,215,123
1897	12,928,821,326	17,355 58	35,421,428
1898	14,278,682,058	17,880 19	39,092,252
1899	16,348,062,701	19,011 67	44,789,212
1900	17,077,100,477	25,898 50	46,786,576
January 1 to July 1, 1901	8,849,732,755	16,881 31	48,893,551
July 1, 1901, to July 1, 1902	18,333,104,706	24,830 79	50,200,204

The following tables show in detail the work done by each engine each month of the year:

ENGINE No. 1.

MONTHS.	Time run. H.	Time run. M.	Revolutions.	Gallons Pumped.
July	420	15	252,527	325,797,372
August	476	10	282,910	408,894,954
September	223	25	130,213	156,197,958
October	510	45	286,343	335,668,374
November	173	15	94,254	79,669,104
December	430	20	250,154	265,916,562
January	136	05	82,329	126,847,122
February	257	55	155,624	225,781,014
March	472	10	275,435	355,940,196
April	345	25	208,610	189,284,910
May	450	20	265,695	298,135,050
June	364	55	222,001	249,740,286
Total	4,261	....	2,506,095	3,017,872,902

ENGINE No. 2.

July	79	10	48,189	39,322,224
August	196	50	121,561	151,047,600
September	422	....	260,578	289,293,288
October	389	25	225,008	241,580,928
November	529	50	325,950	412,348,680
December	724	....	459,476	703,605,288
January	475	05	303,387	388,446,336
February	565	15	353,351	418,487,736
March	450	45	283,700	396,270,840
April	720	....	462,150	729,772,200
May	628	15	400,310	604,086,600
June	437	40	272,880	338,127,840
Total	5,618	15	3,516,540	4,712,389,560

ENGINE No. 3.

July	734	50	467,585	784,120,590
August	550	40	356,803	573,094,872
September	709	15	442,995	741,090,130
October	744	....	443,130	780,702,540
November	317	25	193,880	279,342,628
December	9	30	10,826	9,894,964
January	653	55	404,130	699,507,280
February	648	35	405,950	728,295,650
March	302	....	184,770	332,586,000
April	......	....	....	....
May	241	20	147,170	261,645,520
June	540	10	336,020	577,937,040
Total	5,451	40	3,393,259	5,768,217,214

ENGINE No. 4.

July	741	35	708,985	556,553,225
August	694	15	672,750	528,108,750
September	371	20	341,045	267,720,325
October	84	30	76,350	59,934,750
November	669	05	610,565	479,293,525
December	728	25	647,499	508,286,715
January	602		554,050	434,929,250
February	455	45	436,622	342,748,270
March	659	40	578,780	454,342,300
April	720		649,175	509,602,375
May	565	40	500,187	392,646,795
June	418	05	382,750	300,458,750
Total	6,710	20	6,158,758	4,834,625,030

TOTAL EXPENSE PUMPING WATER, 1901-02.

Fuel coal consumed	$24,830 79
Salaries, engineers, et al	23,847 86
Boiler and engine supplies	312 19
Engine oil	331 36
Kerosene and gasoline	20 64
Waste, rags and packing	346 30
Electric light supplies	104 40
Boiler inspection	36 00
Ice	29 00
Telephone	60 59
Printing and stationery	9 05
Paint, oil and glass	48 67
Hay and bedding	54 23
Hose and couplings	25 35
Repairs, boiler and engine	1,306 37
Farrier	12 50
Express charges	3 00
Miscellaneous	127 13
	$51,505 43

The cost of fuel per million gallons pumped was $1.35, and per million gallons pumped 100 feet high $1.16. The table shows that the amount of water pumped during the year was 18,333,104,706 gallons, which is an increase of 6 per cent compared with the year preceding.

The total expense during the year for pumping water, including maintenance, lighting, heating station, library, and greenhouses, hoisting coal, etc., was $51,505.43, thus making the cost per million gallons pumped $2.80, which is a decrease of 11 per cent compared with the year preceding.

The station duty of coal consumed for all purposes during the year was 83,458,977 foot pounds.

The engines are all in a fair condition and show a good duty, as can be seen from this report. With regard to accidents, the year has been devoid of any but one of minor import, this being the breaking of the connecting rod of No. 3 engine in an old weld.

The additional bearing for No. 1 engine crank shaft made during the past year, with a view of strengthening the same, was a much needed addition. The same improvement was made the previous year on No. 2 engine, and has so far proven itself eminently satisfactory.

The boilers are all in a good condition, and are in need of no immediate repairs.

The furnaces attached to vertical boilers have been rebuilt, thus obviating the difficulty experienced heretofore with regard to the diffusion of heat, the outlet to the boilers being of so small an area as to concentrate the heat in the furnace, thereby making it injurious to all castings and brick work.

The engine house cannot be commented on very much at the present time, for it is undergoing extensive alterations. When completed it will the largest and most beautiful in the United States.

The coal sheds are in their usual condition, but as the coal consumption is becoming greater, it would be advisable to remove the horses elsewhere, so that we would be able to use the sheds for coal only.

If the Commissioners intend to continue using run of mine coal, the most needed improvement at this time would be a coal crusher, placed on top of the hopper house, which would necessitate the building of higher derricks, thus allowing the booms to be made longer, which would be very convenient for unloading vessels.

The two new 25 million pumping engines being erected here are progressing slowly, but expect that one of them will be ready January 1st, 1903. When in service, the pressure in the high district of the city will be more satisfactory than heretofore.

Respectfully submitted.

URIAH GOULD,
Chief Engineer.

REPORT OF THE SUPERINTENDENT OF CONSTRUCTION.

To the Board of Water Commissioners:

Gentlemen—In accordance with the regulations of your Honorable Body, I have the honor of presenting my annual report, relative to the general condition and progress of the work in this department, from July, 1901, to July, 1902.

Work performed at the pumping station from July 1st, 1901, to July 1st, 1902:

Repairs to strainer well No. 1	$ 69 92
Repairs to strainer well No. 2	77 70
Work including gates and screen at strainer well No. 3	2,078 80
Work on strainer well No. 4, not completed	434 09
Building strainer well No. 5, including gates and screens	4,609 23
Building junction well No. 2, including gates and specials	5,834 74
Building junction well No. 3, not completed	1,711 11
Building basin intake, No. 1	2,383 45
Building basin intake, No. 2	1,815 22
Building basin intake, No. 3	584 27
Digging ditch for emergency intake	712 42
Building 98′ 11″ of 5′ conduit and pumping water	1,191 67
Building 26′ 11″ of 5′ conduit reduced from 7′ and pumping water	304 54
Building 535′ 11″ of 7′ conduit and pumping water	7,299 77
Building 291′ 6″ of 10′ conduit and pumping water	9,890 14
Digging open ditch for 10′ conduit	1,791 83
Rebuilding 62′ 3″ of old 6″ conduit	1,018 55
Repairing old 2′ sewer	52 74
Repairing mains in park and building 12″ well over drain line	116 96

Connecting ditch with overflow pipe at 8 inch new well drains	31 50
Digging ditch for ⅝" pipe connecting the Ventura meter with office	67 50
Operating and lowering large gates at large wells	56 05
Cost of 3 48" gates and moving same to cellar for the water galleries at the new addition to the pumping station	2,964 80
Repairs to gate at old intake	116 07
Repairs to old suction well No. 4	13 65
Digging ditch and laying 307' 11" of 6" and 8" pipe with specials and connecting drainage system, with strainer and junction wells	3,466 48
Miscellaneous work at the pumping station and grounds, laying drains, tile, filling lake, completing tool house, building fountain, work for Civil Engineer on ice, boring holes, building and moving shanty, sidewalks, work on house of the engineer of the pumping works and repairs to boilers	7,330 84
	$56,024 34

Distribution System.

The pipe laid outside of the city during the past year was as follows:

Village of Delray, 1,565 feet.

On June 3d, 1902, work was commenced laying pipe in the Village of Woodmere. In Fort street, where work was begun, we had to abandon on account of so much quick sand and water, but work is now in progress farther north, beginning at Artillery and Army. The small amount of pipe laid in said village has not been reported in the mileage of the system.

Inside of the city we laid 52,771 feet, and discontinued 1,356 feet, making a net increase inside of the city of 51,415 feet.

The net increase in the entire system is 52,980 feet, or $10\frac{180}{5280}$ miles.

The Board now owns $40\frac{537}{5280}$ miles outside of city and inside $541\frac{2435}{5280}$ miles, making a total of pipe in system of $581\frac{2972}{5280}$ miles of the different sizes, as follows:

Size of Pipe, Inches.	Measured Length in Feet to July, 1901.	Length in Feet Laid from July, 1901, to July, 1902.	Discontinued Feet from July, 1901, to July, 1902.	Total Length in Feet to July, 1902.
45	103	....	....	103
42	60,367	13,012	....	73,379
36	715	2,887	....	3,602
30	54,494	....	....	54,494
24	84,587	....	....	84,587
20	393	....	....	393
18	87	....	....	87
16	53,805	24	....	53,829
12	37,562	....	....	37,562
10	159,615	4,040	....	163,655
8	322,904	1,821	9	324,716
6	1,370,207	26,056	465	1,395,798
4	805,264	6,251	882	810,633
3	63,221	....	....	63,221
2	4,348	245	....	4,593
Total,	3,017,672	54,336	1,356	3,070,652

Flushing Mains.

The following is the cost of flushing through the blow-off gates in the system:

From March 31st to May 23d, 1902, total of 45 blow-offs.

Cost of labor	$482 08
Cost of teaming	157 50
Bill from Telephone Co	126 00
Oil	1 73
	$767 31

Note—Average per blow-off, $17.05.

At the close of this report will be found a descriptive list of different lines of pipe laid, with locations, lengths, sizes and cost of construction in detail.

There have been placed since July, 1901, 39 tees for the use of the Fire Department.

The total number of gates now in the system amounts to 7,016 of the different makes and sizes, as follows:

GATES IN SYSTEM JULY 1ST, 1902.

SIZE.	42-IN.	36-IN.	30-IN.	24-IN.	20-IN.	18-IN.	16-IN.	12-IN.	10-IN.	8-IN.	6-IN.	4-IN.	3-IN.	TOTAL.
Murdock	5	...	11	16	...	...	27	47	188	457	1,631	1,326	11	3,719
Flowers	20	...	9	18	...	...	...	...	39	52	245	439	20	842
Galvin	...	1	7	12	...	...	21	...	13	31	171	255	1	512
Michigan Brass and Iron Works	10	..	9	2	11	...	13	11	63	151	776	115	....	1,161
Pittsburg	...	...	...	15	...	2	1	1	10	11	31	123	...	194
Roe Stephens	...	...	...	...	...	...	...	6	....	4	43	....	...	53
Eddy	...	...	...	...	...	...	...	...	15	4	6	9	...	34
Scowden (Scott)	...	...	...	...	...	...	...	...	8	19	48	12	...	87
Ludlow	...	...	...	...	...	...	...	...	1	2	9	6	...	18
St. Louis	...	...	...	...	...	...	...	3	....	....	....	....	...	3
Detroit Water Works	4	1	...	...	...	...	...	2	10	33	193	101	...	344
Prong	...	...	...	...	..	...	...	...	....	....	1	....	...	1
Boston	...	...	...	...	...	...	...	...	....	1	1	....	...	2
Newport	...	...	...	...	...	...	...	...	....	....	....	1	...	1
No Name	...	..	...	...	...	...	...	...	....	3	9	32	1	45
TOTAL	39	2	36	63	11	2	62	70	347	768	3,164	2,419	33	7,016

GATES SET IN CITY FROM JULY 1, 1901, TO JULY 1, 1902.

	42-in.	36-in.	12-in.	10-in.	8-in.	6-in.	4-in.	Total
Flowers	....	....	....	....	....	4	3	7
Michigan Brass & Iron Works	....	....	....	....	....	7	....	7
Murdock	...	....	....	....	....	1	....	1
Galvin	...	....	....	....	....	1	....	1
Detroit Water Works	4	1	1	5	3	40	29	83
Total	4	1	1	5	3	53	32	99

GATES SET IN DELRAY, FROM JULY 1, 1901, TO JULY 1, 1902.

	4-in.	
Michigan Brass and Iron Works	1	Shut-off.

GATES SET IN RIVER ROUGE, FROM JULY 1, 1901, TO JULY 1, 1902.

	4-in.	
Detroit Water Works	1	Shut-off.
" " "	1	Blow-off.

GATES SET IN WOODMERE, FROM JULY 1, 1901, TO JULY 1, 1902.

	12-in.	8-in.	6-in.	4-in.	
Detroit Water Works	1	1	4	2	Shut-off.

TABLE OF GATES TAKEN OUT OF SYSTEM, FROM JULY 1, 1901, TO JULY 1, 1902.

No. of each kind.	KIND.	SIZE.	REMARKS.
1	Murdock	12-in.	Shut-off System.
2	"	6-in.	" "
1	Detroit Water Works	6-in.	" "
5	Murdock	4-in.	" "
2	Ludlow	4-in.	" "
1	Flowers	4-in.	Blow-off "
7	Murdock	4-in.	" "
19	Total.		

GATES SET AND RE-SET FOR BLOW-OFFS, FROM JULY 1, 1901, TO JULY 1, 1902.

No. of each kind.	KIND.	SIZE.	REMARKS.
3	Detroit Water Works	10-in.	Set New.
4	" " "	6-in.	" "
1	Murdock	6-in.	" "
13	"	4-in.	" "
4	Flowers	4-in.	" "
1	Detroit Water Works	4-in.	" "
1	Michigan Brass and Iron Works	6-in.	Re-set.
3	" " " " "	4-in.	" "
1	Flowers	4-in.	" "
5	Murdock	4-in.	" "
36	Total.		

The following is a statement of examinations, operations and repairs of gates, gate wells, gate boxes, etc., from July 1, 1901, to July 1, 1902:

6,272 gates examined.
70 gates were out of order July 1, 1901.
186 gates were out of order since July 1, 1901.
170 gates repaired.
4 gates fitted with larger heads to stem.
188 gate wells built over gates on old lines.
60 gate wells built over gates on new lines.
3 gate wells enlarged.
38 gates were cleaned.
3 wood boxes replaced with iron boxes.
37 boxes were readjusted to grade of street.
8,214 blow-offs were operated for blowing off dead ends.
1,224 gates were shut and opened for flushing.
6,224 gates were shut and opened for various purposes.
30 blow-offs were repaired.
2,413 wells in system.
39 tees set for Fire Department.

Total and average cost of wells built over gates from July, 1901, to July 1902:

	OVER GATES IN OLD LINES.		Average
15	gate wells 10″, 12″ and 16″ gates	$ 561 56	$37 44
172	gate wells 4″, 6″ and 8″ gates	3,438 70	19 99
1	gate well 3″ gate	20 94	
188		$4,021 20	

	OVER GATES IN NEW LINES.		
4	gate wells 42″ gates	$1,266 71	$316 68
1	gate well 36″ gate	300 26	
49	gate wells 4″, 6″ and 8″ gates	936 12	19 65
5	gate well 10″, 12″ and 16″ gates	160 14	32 03
1	gate well over 3 1″ service cocks	19 32	
60		$2,709 55	
	Total cost 248 gate wells	$6,730 75	

Also 1 well over 42″ manhole casting	$ 39 79
12 wells over and near curves on 42″ line	1,740 80
2 wells rebuilt over 30″ gates	106 68

Leaks in Mains from July, 1901, to July, 1902.

Between the above dates, 11 leaks were repaired in the mains of the distribution system, as follows:

DATE.	LOCATION.	SIZE.	COST.
1901			
Aug. 3	Pumping Works Grounds	42-inch.	$47 99
Oct. 5	Pumping Works Grounds	42 "	5 00
Dec. 23	Jefferson and Holcomb	42 "	715 77
Dec. 4	Randolph, south of Fort	6 "	51 68
1902			
Feb. 22	Anspach (Delray)	6 "	6 31
April 11	Randolph, north of Atwater	8 "	14 46
April 4	Jefferson and Beaufait	42 "	24 41
April 23	Rowland, alley w. of, s. of Grand River	4 "	5 89
May 29	Michigan, east of Brooklyn	8 "	6 00
June 26	Theodore, west of Rivard	4 "	4 07
June 13	Alley north of Woodbridge, east of Griswold	4 "	15 72

STATEMENT OF LEAKS, COMPLAINTS, ETC., FROM JULY 1, 1901, TO JULY 1, 1902.

MONTHS.	LEAKS.			COMPLAINTS.				SHUT.				LET ON.			
	In Mains.	In Service Pipe.	False Reports	No Water.	Bad Water.	Short Supply	Water Running.	Vacant	Non-payment.	For Leak.	Miscellaneous	Vacant Re-occupied.	Non-payment.	New.	Miscellaneous
1901															
July	5	36	5	11	9	8	1	3	12	......	......	5	......	......	......
August	3	46	......	4	7	......	2	4	10	......	5	6	1	1	8
September	3	22	......	2	......	2	......	......	......	......	11	3	1	1	3
October	7	22	......	14	1	4	......	4	6	......	14	3	......	......	1
November	2	28	......	21	2	5	......	7	11	......	10	4	2	......	4
December	3	21	......	22	1	1	......	......	5	......	7	......	......	......	4
1902															
January	......	33	......	15	......	3	3	......	......	......	7	......	......	......	2
February	7	52	......	53	2	1	......	......	11	......	3	......	......	......	7
March	4	40	......	41	1	1	......	......	......	3	4	......	......	......	6
April	6	49	......	57	5	4	1	......	......	......	4	......	......	......	8
May	4	29	......	13	3	11	......	......	......	......	17	......	......	......	7
June	4	17	......	1	......	10	......	......	......	......	5	......	......	......	3
Total	48	395	5	254	31	50	7	18	55	3	87	21	4	2	53

PIPE LAID FROM JULY 1st, 1901, TO JULY 1st, 1902.

Date.	LOCATION OF PIPE.	Feet	Size.	COST OF CONSTRUCTION.												
				Pipe.	Advertising.	Specials.	Lead.	Gates.		Sundries.	Gate-wells.	Hauling.	Re-paving	Sup. & Eng.	Labor.	Total Cost.
								No.	Cost.							
June 2, 1902	Antoine st., from s. line of Medbury to 5 ft. s. of n. of alley s. of same.	147	6 in.	$ 59 35	....	$ 4 31	$ 9 14	....	$ 10 43	$ 1 08	$ 18 78	$ 3 00	....	$ 7 35	$ 10 07	$ 183 51
S'pt. 18, 1901	Baker st., from 27 ft. w. of e. of Campbell to 216 ft. e. of same..	243	6 in.	94 26	....	3 99	10 18	....	20 80	1 67	16 55	3 50	....	12 15	51 38	214 48
Apr. 17, 1902	Boulevard, from 10 ft. 6 in. n. of n. of Champlain st. to 358 ft. 6 in. n. of n. of same.................	350	6 in.	141 13	....	9 89	12 79	....	10 43	1 06	17 54	4 75	....	17 50	64 07	279 16
J'ne 2, 1902	Brush st., from 6 ft. n. of s. of Alley n. of Smith st. to 22 ft. 6 in. n. of s. of same..........................	183	8 in.	105 00	....	11 28	14 18	2	23 63	1 22	38 96	9 75	....	9 15	122 22	335 39
S'pt. 21, 1901	Collins st., from 25 ft. s. of n. of Medbury st. to 185 ft n. of same.......	210	6 in.	81 46	....	3 71	10 12	....	12 75	1 84	17 01	5 25	......	10 50	44 33	186 97
Oct. 21, 1901	Cavalry Ave., from 18 ft. n. of s. of Celeron st. to 27 ft. n. of s. of Lafayette ave......................	332	6 in.	128 78	....	5 91	13 80	....	12 75	1 55	16 53	5 25	....	16 60	75 06	276 23
Nov. 5, 1901	Cora ave.. from 21 ft. e. of w. of River st. to 630 ft. w. of w. of same, also in River st. from 5 ft. n. of n. of Cora st. to 19 ft. 6 in s. of n. of same	651 25	4 in. 6 in.	156 18 9 70	......	5 03	16 56	2	16 10	1 04	17 66	6 00	....	33 80	81 39	343 46
Apr. 17, 1902	Canfield ave., from 20 ft. e. of w. of Orleans st. to 10 ft. 5 in. e of w. of same............................	17' 2"	6 in.	6 94	....	20 91	10 96	....	10 43	13 27	18 71	3 75	....	....	20 44	105 41
May 12, 1902	Copeland ave., "Delray," from 1106 ft. w. of w. of River st. to 2008 ft. w. of w. of same.........	902	4 in.	225 27	....	6 81	25 58	....	7 73	3 90	17 69	10 50	....	45 10	184 53	527 11
May 17, 1902	Cavalry ave. and Amherst st., from 23 ft. s. of n. of Amherst to 21 ft. 8 in. n. of s. of Howard.....	313	6 in.	126 38	....	3 93	10 96	....	10 43	84	17 97	3 50	... ...	15 65	65 99	255 65
May 28, 1902	Christiancy st., from 40 ft. e. of w. of Junction ave. to 312 ft. w. of w. of same..........................	312	6 in.	125 77	... .	8 03	10 96	....	10 43	229	18 55	3 50	....	15 60	86 36	281 69
Nov. 18, 1901	Canton ave., from 19 ft. n. of n. of Strong to 263 ft. n. of n. of same.	310' 8"	6 in.	120 52	....	10 00	13 85	2	20 80	1 23	16 53	4 25	....	15 55	81 23	283 96
July 12, 1901	Christiancy st., from 26 ft. 6 in. w. of e. of Campbell to 26 ft. w. of e. of Cavalry ave......................	578	6 in.	223 03	. ...	2 94	21 73	....	12 75	96	16 45	12 25	....	28 90	69 58	388 59

June 4,	1902	Cass ave., from Cross on Milwaukee to n. line of Milwaukee & Cass ave..	24'9"	8 in.	$ 14 20	... .	$ 53	$ 1 57	....	......	$ 02	....	$ 1 25	....	. .....	$ 17 25	$ 34 82
June 9,	1902	Campau ave. and Mullet st., for the "Park Board	108	4 in.	26 97	....	9 33	5 15	....	....	54	....	1 25	....	$ 5 40	6 25	51 89
Oct. 31,	1901	Euclid ave., north side, from 693 ft. e. of e. line of Hamilton Boulevard to 130 ft. w. of w. line of Second st.	890	4 in.	213 51	....	5 30	20 98	....	$ 8 05	2 06	$ 17 16	5 25	....	44 50	193 53	510 34
Dec. 14,	1902	Ellery, from Heidelberg to Berlin st..	282	6 in.	109 39	....	1 10	9 89	....	12 75	91	16 77	6 00	....	14 10	55 82	226 73
July 9,	1901	Frontenac st., West Lawn, from 28 ft. s. of n. of St. Paul to 406 ft. n. of n. of same........................	450	6 in	160 31	....	5 94	14 49	....	8 10	94	....	7 00	....	22 50	95 68	314 96
May 22,	1902	Forest ave., from 21 ft. e. of w. of Rivard to w. line of Russell........	426	4 in.	106 37	....	6 71	12 79	....	7 73	4 51	41 56	3 88	....	21 30	138 44	343 29
May 28,	1902	Ferdinand ave., from 25 ft. n. of s. line of Toledo to 385 ft. s. of same.	410	6 in.	165 53	....	1 10	15 75	....	10 43	1 29	18 12	3 50	....	20 50	80 63	316 85
Dec. 9,	1901	Ferdinand ave., from 384 ft. s. of n. Toledo to 405 ft. 4 in. n. of n. of Dix ave..........................	427	6 in.	165 64	....	7 78	11 87	....	....	1 12	....	3 50	... ...	21 35	67 74	279 00
June 9,	1902	Fort st., Woodmere, from w. line of Artillery to 20 ft. w. of east line of Crawford.....	484	6 in.	195 42	....	13 17	18 27	....	10 43	2 48	18 40	5 00	....	24 20	113 58	409 95
Aug. 3,	1901	Greenfield ave., from 29 ft. s. of n. of Pallister to 246 ft. s. of south of same.............	288	6 in.	111 72	....	5 30	9 35	2	20 90	56	16 14	7 00	....	14 40	59 95	245 32
Sept. 16,	1901	Gransel st., from 3 ft. s. of n. of Julia to 30 ft. s. of n. of same.	27	6 in.	10 67	....	36	1 93	....	....	13	....	1 25	....	....	9 54	23 88
Sept. 23,	1901	Garfield ave., from 20 ft. e. of w. of Heck place to 119½ ft. w. of same.	139½	6 in.	54 12	....	4 29	4 23	....	12 75	31	15 19	2 06	....	6 98	18 35	118 28
Oct. 21,	1901	Guoin st., from 23 ft. w. of e. of Lieb st. to 174 ft. e. of e. of same............................	201	4 in.	52 26	....	13 00	6 63	. ..	....	1 44	Meter Well 47 54	4 75	....	10 05	60 30	195 97
May 3,	1902	Garfield ave., from 3 ft. e. of w. of Mt. Elliot to 21 ft. e. of e. of Heck.	323	6 in.	130 41	....	1 40	10 96	....	10 43	54	19 34	3 88	....	16 15	62 78	255 89
July 26,	1901	Harper ave., from 20 ft. w. of e. of McClellan to 308 ft. w. of e. of same.	288	6 in.	111 72	....	5 46	9 46	...	....	83	. .....	3 50	....	14 40	83 05	228 42
July 18,	1901	Harper ave., from St. Aubin to end of street or beginning of "Right of Way".................	675	10 in.	509 90	....	77 51	43 84	....	54 00	2 63	40 55	10 32	....	33 75	218 85	991 35
July 7,	1901	Harper ave., from 22 ft. e. of w. of Dubois to 15 ft. 3 in. e. of w. of St. Aubin.........	471	8 in.	313 57	....	15 71	39 88	....	36 00	6 29	38 31	17 50	....	26 95	245 08	739 79
		Also St. Aubin Ave., from 36 ft. 7 in. n. of n. of Harper to 26 ft. 6 in. s of n. of same..	63	8 in.													
		Also for connecting at Dubois st..	2' 4" 2' 7"	8 in. 6 in.													

PIPE LAID FROM JULY 1st, 1901, TO JULY 1st, 1902—CONTINUED.

Date.	LOCATION OF PIPE.	Feet	Size.	COST OF CONSTRUCTION. Pipe.	Advertising.	Specials.	Lead.	Gates. No.	Gates. Cost.	Sundries.	Gate-wells.	Hauling.	Repaving	Sup. & Eng.	Labor.	Total Cost.
Aug. 5, 1901	Horatio st., from 18 ft. e. of w. of 33rd st. to 20 ft. e. of w. of 34th st., and from 25 ft. n. of s. of Horatio to 247 ft. n. of same	268 282	4 in. 6 in.	$213 43		$ 10 24	$23 32	2	$20 90	$1 32	$19 17	$8 75		$27 52	$131 55	$456 20
Aug. 15, 1901	Holcomb ave., from 27½ ft. s. of s. of Gratiot to 390½ ft. s. of same	119	6 in.	46 16		5 35	6 33			22		3 00		5 95	35 17	102 18
Aug. 21, 1901	Helen ave., from 4 ft. 8 in. n. of s. of Kercheval to 4 ft. s. of s. of same	48	6 in.	18 62		2 75	2 37			25		75			14 24	38 98
Sept. 20, 1901	Hancock st., from end of Pipe 117 ft. e. of e. to 267 ft. e. of e. of Maybury Grand Ave.	150	6 in.	58 19			4 40			31		1 75		7 50	31 20	103 35
Sept. 23, 1901	Heck Place, from 31½ ft. n. of s. of Forest ave. to 25 ft. s. of n. of Garfield	416½	6 in.	161 57		9 90	15 64		12 75	1 71	15 52	3 50		20 83	91 40	332 82
Oct. 2, 1901	Hendrie ave., from e. line of Brush st. to 23 ft. e. of w. of Beaubien	334	4 in.	84 71		27	5 15		8 05	52	32 80	4 75		16 70	147 59	300 54
Nov. 14, 1901	Haigh ave., from 23 ft. e. of e. of John R. to 5 ft. e. of e. of Brush st.	715	6 in.	277 74		7 14	23 74		12 75	2 22	16 58	10 00		35 75	191 40	577 32
May 2, 1902	Harper ave., from 20 ft. w. of e. of Antoine to 153 ft. 10 in. e. of e. of same	179	4 in.	44 69		6 00	5 48		15 46	76	18 05	3 00		8 95	43 70	146 09
May 3, 1902	Hurlbut ave., from 708 ft. n. of n. line of Kercheval to 1,387 ft. n. of n. line of same	679	6 in.	274 15		6 81	22 97		18 16	2 26	18 79	6 50		33 95	162 24	545 83
June 19, 1902	Holcomb ave., from 4 ft. n. of n. of Medbury ave. to 362 ft. 6 in. s. of s. of same	366	6 in.	147 98		61	11 22			2 72	20 20	4 75		18 35	147 25	353 08
June 27, 1902	Hammond ave., from 35 ft. s. of n. of Norton to 13 ft. s. of n. of Stark st.	110	6 in.	44 41			5 56		21 00		18 09	2 50		5 50	40 75	146 70
Aug. 19, 1901	Illinois st., from 12 ft. e. of e. of Collins to end of 4 ft. pipe n. of Moran st.	527	6 in.	204 43		9 49	18 26			1 41		10 50		26 35	114 92	385 86
Apr. 28, 1902	Saint Ignatius st., from 24 ft. s. of n of Garfield to 5 ft. s. of n. of alley s. of Garfield, also alley s. of Garfield from 18 ft. w. of e. of Riopelle to 5 ft. e. of w. of St. Ignatius st.	282 152	4 in. 6 in.	70 42 61 37		10 06	10 96		10 43	2 44	18 64	5 03		21 70	133 02	344 07
July 20, 1901	Junction ave., from 9 ft. s. of n. of Otis to 25 ft. n. of n. of same	25	6 in.	9 70		9 62	1 87			14		1 75			8 94	32 02

Sept. 16, 1901	Julia st., from 30 ft. e. of w. of Greusel to 175 ft. w. of w. of same	205	6 in.	79 58		6 07	7 70		8 05	44		2 00		10 25	41 38	155 42
Nov. 13, 1901	Josephine st., from 23 ft. e. of w. of Oakland ave. to 715 ft. w. of w. of same	738	6 in.	286 28		13 47	19 55	2	20 80	1 62	17 60	7 50		36 90	143 23	546 95
Aug. 26, 1901	Kercheval ave., crossing same, from 30 ft. n. of s. of same, to 17 ft. 8 in. n. of s. of same	14	8 in.	8 15		3 95	1 16			16		75			7 12	21 29
Aug. 27, 1901	Kirby ave., at 13th st., from 26 ft. n. of s. of Kirby to 73 ft. 6 in. n. of s. of same	49	6 in.	19 01		36	1 65			24	21 23	4 75			5 79	53 03
Oct. 17, 1901	Kirby ave., from 25 ft. w. of e. of Tillman to 25 ft. e. of w. of 23rd st.	493	6 in.	191 25		4 22	13 80			1 08	16 79	4 25		24 65	140 71	396 75
Dec. 7, 1901	Kirby ave., from w. line of Russell to e. line of Rivard, also 3 ft. 6 in. of 4 in. pipe east of the west line of Russell st.	3' 6" 364'	4 in. 6 in.	142 06		3 70	9 89		8 05	1 55	36 08	6 00		18 40	106 42	332 15
May 10, 1902	King ave., from 69 ft. w. of w. of Cameron to 250 ft. w. of w. of same	180	6 in.	72 68		2 75	5 48			37		1 75		9 00	34 16	126 19
July 22, 1901	Leland st., from 6 ft. 10 in. e. of e. of Collins to 204 ft. e of same	208	6 in.	84 77			7 70			31		1 75		10 40	31 08	136 81
July 29, 1901	Lessing st., from 156 ft 7 in. e. of e. of McClellan to 355 ft. e. of e. of same	195	6 in.	75 66		4 66	9 46			53		3 50		9 75	31 87	135 43
Oct. 14, 1901	La Salle ave., from 2 ft. 5 in. s. of north line of Horatio to 371 ft. n. of n. of same	398	6 in.	152 45		5 11	13 66		20 80	1 29	16 79	5 00		19 65	113 56	348 31
Oct. 19, 1901	Lansing st., from 159 ft. n. of n. of Christiancy to 386 ft. s. of south of Dix	386	6 in.	149 73		3 08	10 58			1 25		5 25		19 30	61 99	251 18
Oct. 28, 1901	Lafayette ave., from 26 ft w. of e. of 25th st. to north line of 24th st., also 16 ft. of 6 in. pipe in 25th and Lafayette	389 16	4 in. 6 in.	93 83		4 89	11 87			1 77	16 06	5 25		19 45	78 31	231 93
July 2, 1901	Mason st., from e. line of McClellan to 530 ft. e. of same	530	6 in.	188 81		7 13	15 64		23 10	94	19 95	10 50		26 50	151 81	444 38
July 26, 1901	McClellan ave., from 296 ft n. of Gratiot to 26 ft. n. of s. of Harper	787	6 in.	305 28		10 23	33 11		12 75	2 19	15 35	17 50		39 35	202 34	638 00
Aug 14, 1901	Medbury ave., "alley" south of, from e. line of Brush to 19 ft. w. of e. of Beaubien	336½	6 in.	130 54		15 02	16 50		12 75	97	35 70	7 00		16 83	108 31	343 62
Aug. 21, 1901	Maxwell st., from 21 ft. s. of n. line of Hendrie to 150 ft. n. of west line of Congress w	860	6 in.	365 00		14 59	36 08		12 75	1 58	45 51	15 00		47 15	268 51	806 17
	Also Hendrie ave., e. from w. line of Maxwell to main	26	6 in.													
	Also Medbury, from main to Maxwell	27' 6"	6 in.													
	Also Congress, from main in Maxwell to west line	30	6 in.													

PIPE LAID FROM JULY 1st, 1901, TO JULY 1st, 1902—CONTINUED.

Date.	LOCATION OF PIPE.	Feet	Size.	COST OF CONSTRUCTION.												
				Pipe.	Advertising.	Specials.	Lead.	Gates.		Sundries.	Gatewells.	Hauling.	Repaving	Sup. & Eng.	Labor.	Total Cost.
								No.	Cost.							
Nov. 7, 1901	Marston ave , from 35 ft. w. of e. of Hastings to 23 ft. 6 in. w. of Cameron ave	326	6 in.	126 46	.. ....	1 10	11 87	....	12 75	1 02	17 36	4 82	....	16 30	82 90	274 58
May 27, 1902	Medbury ave., "alley" s. of, from 18 ft. 6 in. e. of w. of Hastings to 20 ft. 6 in. w. of e. of Antoine	620	4 in.	154 81	....	5 19	14 62	....	7 73	2 06	17 80	4 75	86	31 00	131 31	370 13
May 16, 1902	McDougall ave., from 158 ft. s. of s. of Frederick to 13 ft. s. of south of Kirby	515	6 in.	207 93	....	4 10	14 44	....	10 43	2 50	19 70	5 25	....	25 75	206 10	496 20
July 30, 1901	North Boulevard, from 29 ft. 8 in. w. of e. of Moran st. to 298 ft. e. of e. of same	327	6 in.	126 86	....	9 87	14 19	2	20 80	1 18	17 58	7 00	....	16 35	123 93	337 81
July 15, 1901	Otis st., from 26 ft. e. of w. of Wesson to 340 ft. e. of e. of same	379	6 in.	147 02	....	10 05	16 50	2	20 80	75	17 57	8 75	....	18 95	68 86	309 25
July 22, 1901	Otis st., from 9 ft. 6 in. e. of w. of Junction ave. to 236 ft. w. of same.	247	6 in.	95 82	....	3 99	8 36	....	12 75	23	16 14	7 00	....	12 35	32 58	189 22
Nov. 1, 1901	Orleans st., from s. of s. of Leland to 19 ft. s. of n. line of Illinois	221	6 in.	85 73	....	6 14	9 89	....	12 75	1 10	18 06	4 75	....	11 05	85 81	235 28
	Oakland, from Josephine to Holbrook	351½	10 in.	251 17	....	16 33	23 23	....	27 00	1 45	18 96	7 25	....	17 60	122 51	485 50
Apr. 19, 1902	Orleans st., from 19 ft. 7 in. n. of s. of Canfield to 37 ft. n. of s. of Garfield	442	6 in.	178 46	....	2 53	12 79	....	10 48	2 19	17 47	3 88	....	22 10	131 61	381 46
July 13, 1901	Pierce st., from 15 ft. 8 in. west of Riopelle to 185½ feet e. of e. of same	201	4 in.	50 97	....	11 08	9 24	...	8 05	4 36	15 58	4 66	. .....	10 05	122 07	236 06
July 23, 1901	Pallister ave., south lawn, from 38 ft. e. of w. of Woodward to 31½ ft. e. of w. of Hamilton	2,681	6 in.	1,034 52	....	39 13	94 53	4	51 00	7 94	62 49	22 75	....	134 05	593 51	2,039 92
Oct. 17, 1901	Park View ave., from 607 ft. s. of s. of Jefferson to 737 ft. south of south of same	130	6 in.	50 43	....	3 99	3 91	....	8 05	49	....	1 75	....	6 50	32 14	107 26
June 11, 1902	Pennsylvania and Kercheval, from 1,913 ft. 8 in. n. of n. of Kercheval "north"	662	6 in.	267 65	....	5 64	17 62	....	10 43	4 30	15 75	6 50	....	33 15	234 69	595 73
Oct. 28, 1901	Palmer ave., from Russell st. to 14 ft. 6 in. w. of e. line of Rivard	383	6 in.	148 57	....	8 03	10 35	....	8 05	1 44	17 10	4 00	.... ..	19 15	104 43	321 12

July 28, 1901	Russell st., from 118 ft. s. of s. of Piquette to 182 ft. n. of north of Piquette ave. and railroad........	380	10 in.	287 06	.. ..	31 50	22 83	....	27 00	3 28	15 18	14 00	9 05	19 00	478 82	907 72
Nov. 14, 1901	Rogers st., from 40 ft. e. of w. of Campbell to 237 ft. w. of w. of same	297½	6 in.	115 41	....	5 11	10 35	2	20 80	69	17 80	4 75	....	14 90	40 42	230 23
Apr. 6, 1902	Riopelle st., from n. line of Milwaukee to 57 ft n. of s. of Boulevard..	438	8 in.	251 30	....	13 05	18 27	....	10 43	2 17	38 98	8 25	....	21 90	164 27	528 62
July 18, 1901	Springwells ave., "Delray," from end of pipe 163 ft. n. of n. of M. C. R. R. private way to 18⅛ ft. n. of n. of South st....	663	4 in.	168 04	....	9 33	20 35	....	8 05	92	15 35	15 32	....	33 15	80 19	350 80
Sept. 26, 1901	Stanton ave., from 23 ft. s. of n. of McGraw to 296½ feet n. of n. of same..............................	321½	6 in.	124 72	....	10 86	8 74	2	20 80	1 02	15 94	3 00	....	16 08	75 33	276 49
Apr. 11, 1902	Sheridan ave., from 17 ft. 6 in. n of n. of Kirby to 101 ft. n. of n. of Ferry st.........................	509	6 in.	207 15	....	5 34	18 27	....	10 43	1 31	16 93	5 75	....	26 25	94 57	386 00
Apr. 14, 1902	Shepherd st., from 135 ft. 6 in. n. of n. of St. Paul to south line of Kercheval........................	529	6 in.	213 59	....	7 73	12 79	....	10 43	1 12	18 05	4 75	....	26 45	84 73	379 64
July 16, 1901	Twenty-ninth st., from 75⅛ ft. n. of n. of Chicago & G. T. R. R. to n. line of same.....	75½	6 in.	21 98	....	3 99	3 85	....	8 05	34	.....	1 75	....	....	21 39	60 45
Oct. 10, 1901	Thirtieth st., from 4 ft. 2 in. n. of n. line of Buchanan st. to 11 ft. n. of s. of Rich st................	588	6 in.	228 10	....	7 70	19 32	....	8 05	1 67	....	5 00	....	29 40	135 59	434 83
June 25, 1902	Thirty-second st., from 80 ft. n. of n. of Horatio to 270 ft. n. of n. of Herbert...........................	889	6 in.	358 93	....	8 97	27 14	....	10 43	4 49	19 04	7 00	....	44 50	273 66	754 16
June 26, 1902	Thirty-third st., from 247 ft. 8 in. n. of n. of Horatio to 432 ft 2 in. n. of same.............................	183½	6 in.	74 09	....	4 10	6 53	....	....	70	....	2 19	....	9 20	61 00	157 81
Aug. 5, 1901	Theodore st., from 14 ft. e. of e. of Collins to 100 ft. e. of e. of same..	86	6 in.	33 37	....	1 24	4 73	....	10 43	68	....	1 75	.. ....	......	16 50	68 70
Apr. 1, 1901	"Unknown" st., from 28 ft. w. of e. of Beecher to 295 ft. w. of w. of same.............................	328	6 in.	132 43	....	13 72	11 78	....	18 16	3 06	20 38	9 75	..... .	16 40	133 69	359 37
May 3, 1902	Warren ave., from 183 ft. e. of e. of Collins to west line of Moran......	497	6 in.	200 66	....	1 40	14 62	...	10 43	1 53	18 68	4 75	....	24 85	187 26	414 18

REPORT OF 42 IN. AND 36 IN. PIPE LINES LAID BETWEEN NOVEMBER 1st, 1901, AND JUNE 30th, 1902, INCLUDING CONTINGENT LINES CONNECTING THEREWITH.

Date.	LOCATION OF PIPE.	Feet	Size.	COST OF CONSTRUCTION.									
				Pipe.	Specials.	Lead.	Gates. Cost.	Sundries	Gatewell	Hauling.	Sup. & Eng.	Labor.	Total Cost.
June 30, 1902	Sylvester ave., from end of 42 in. pipe 5 feet e. of e. of centre line of Belvidere to Hurlbut ave., thence s. on Hurlbut to 433 feet south of south line of Jefferson, or in pumping works grounds, to "Ventura" meter	8,116	42 in.	$ 58,841 00	$1,160 75	$3,361 11	$ 1,711 57	$1,217 81	$2,452 00	$1,836 20	$405 80	$ 27,950 61	$ 98,936 85
June 30, 1902	Sylvester ave., from end of pipe e. of Crane to 8 ft. w. of w. of Frontenac Boulevard; 170 feet of this was laid in Van Dyke from Sylvester north to Sylvester south	4895	42 in.	35,488 75	960 10	1,579 16	1,696 76	783 04	809 50	1,085 83	244 75	17,667 58	60,315 47
June 30, 1902	Sylvester ave., from 8 feet w. of w. of Frontenac Boulevard to Mt. Elliot, thence north to 78 feet south of Gratiot Ave.	427 2460	36 in.	14,918 16	289 58	510 37	633 73	480 26	355 60	216 53	123 00	10,139 66	27,661 89
June 30, 1902	Mt. Elliot, alley east of from Sylvester to Engine House No. 18	245 83	2 in. Lead	45 32 14 94	5 12	2 08	....	09	14 27	1 25	....	70 25	158 32
June 30, 1902	Frontenac Boulevard, from 42 in. main in Sylvester north	23' 8"	16 in.	38 48	2 83	3 53	....	29	....	1 25	....	22 07	68 45
June 30, 1902	Sylvester, crossing Frontenac Boulevard	153	6 in.	61 77	10 48	6 10	21 00	57	22 21	1 75	....	58 39	182 27

PIPE LOWERED FROM JULY 1st, 1901, TO JULY 1st, 1902.

Date.	LOCATION OF PIPE.	Feet	Size.	Cost.
Oct. 25, 1901	Alley, west of Washington and s. of Grand River ave.	298	4 in.	$274 83
	Hibbard avenue, from 25 feet s. of n. of Jefferson to 82 feet n. of n. of same	107	6 in.	126 97
Nov. 8, 1901	Alley, east of Farrar and north of Monroe ave.	51	4 in.	138 21
	Alley, east of Farrar and south of Gratiot	113	6 in.	123 88
	Alley, south of Gratiot and e. of Farrar	146	6 in.	151 76
May 21, 1902	Burlingame and Second st.	294	6 in.	231 92
May 28, 1902	Daniels brick yard, Springwells	75	4 in.	57 98
		1,084	......	$1,105 55

All of which is respectfully submitted.

LUKE CROSSLEY,
Superintendent of Construction.

SUPPLEMENT.

BOARD OF MANAGEMENT OF DETROIT WATER WORKS

Board of Trustees appointed by Common Council, February 24th, 1852; organized March 1st, 1852.

Shubael Conant, Chairman. Edmund A. Brush.
Henry Ledyard. Wm. R. Noyes.
Jas. A. Van Dyke.

1853

On the 16th of May, 1853, the Board of Water Commissioners of the City of Detroit was organized under an act previously approved by the Common Council and passed by the Legislature, February 14th, 1853. The term of service was determined by lot, as follows:

Jas. A. Van Dyke,	for 3 years.
Edmund A. Brush,	for 4 years.
Henry Ledyard,	for 5 years.
Shubael Conant,	for 6 years.
Wm. R. Noyes,	for 7 years.

Shubael Conant was elected President, who, finding the duties too arduous, resigned July 30th, and Edmund A. Brush was elected.

1854

Edmund A. Brush, President. Jas. A. Van Dyke.
Shubael Conant. Wm. R. Noyes.
Henry Ledyard.

1855.

Edmund A. Brush, President.
Henry Ledyard.
Shubael Conant.
William R. Noyes.
James A. Van Dyke, died May 8th.
A. D. Fraser, appointed to fill vacancy.

1856.

Edmund A. Brush, President.
Shubael Conant.
Wm. R. Noyes.
Alexander D. Fraser, re-appointed May 1st, for 5 years.
Henry Ledyard.

1857.

Edmund A. Brush, President, re-appointed May 1st, for 5 years.
Henry Ledyard.
Alexander D. Fraser.
William R. Noyes.
Shubael Conant.

1858.

Edmund A. Brush, President.
Shubael Conant.
Alexander D. Fraser.
Henry Ledyard, re-appointed May 1st, for 5 years.
Wm. R. Noyes.

1859.

Edmund A. Brush, President.
Alexander D. Fraser.
Wm. R. Noyes.
Shubael Conant, term expired May 1st, and
Julius D. Morton, appointed for 5 years.
Henry Ledyard, vacated by moval from city, and
John V. Ruehle, appointed May 1st to fill vacancy.

1860.

Edmund A. Brush, President.
Alexander D. Fraser.
Julius D. Morton.
William R. Noyes, re-appointed May 1st, for 5 years.
John V. Ruehle.

1861.

Edmund A. Brush, President.
Alexander D. Fraser, re-appointed May 1st for 5 years.
Jno. V. Ruehle, resigned Sept. 16th, and
Chauncey Hurlbut appointed to fill vacancy.

1862.

Edmund A. Brush, President, re-appointed May 1st, for 5 years.
Wm. R. Noyes.
Julius D. Morton.
Chauncey Hurlbut.
Alexander D. Frazer.

1863.

Edmund A. Brush, President.
Alexander D. Frazer.
Wm. R. Noyes.
Julius D. Morton.
Chauncey Hurlbut, term expired May 1st, and
Stanley G. Wight, appointed for 5 years.

1864.

Edmund A. Brush, President.
Alexander D. Frazer.
Wm. R. Noyes.
Julius D. Morton, term expired May 1st.
Stanley G. Wight.

1865.

Edmund A. Brush, President.
Wm. R. Noyes, resigned Jan. 10, and Jacob S. Farrand appointed to fill vacancy, Term expired May 1st. Re-appointed for 5 years.
Alexander D. Frazer.
Stanley G. Wight.
Julius D. Morton, re-appointed for 5 years from May 1st, 1864. Died Feb. 1865, and
Jno. Owen appointed to fill vacancy.

1866.

Edmund A. Brush, President.
Alexander D. Fraser, re-appointed May 1, for 5 years.
Stanley G. Wight.
Jacob S. Farrand.
Jno. Owen.

1867.

Edmund A. Brush, President, re-appointed May 1, for 5 years.
Alexander D. Fraser.
Jacob S. Farrand.
Jno. Owen.
Stanley G. Wight.

1868.

*Edmund A. Brush, President.
Stanley G. Wight, term expired May 1, and
Chauncey Hurlbut appointed for 5 years.
Jacob S. Farrand.
John Owen.
Caleb Van Husan.

*Edmund A. Brush resigned January 28, and Caleb Van Husan appointed to fill vacancy, and Alexander D. Fraser elected President.

1869.

Alexander D. Fraser, President.
John Owen, re-appointed May 1, for 5 years.
Jacob S. Farrand.
Caleb Van Husan.
Chauncey Hurlbut.

1870.

Alex. D. Fraser, President.
Jacob S. Farrand, re-appointed May 1, for 5 years.
Jno. Owen.
Caleb Van Husan.
Chauncey Hurlbut.

1871.

*Alex. D. Fraser, President.
Jacob S. Farrand.
Caleb Van Husan.
Chauncey Hurlbut.
John Owen.

*Term expired May 1, and Samuel F. Hodge appointed for 5 years. Jacob S. Farrand elected President.

1872.

Jacob S. Farrand, President.
Jno. Owen.
*Caleb Van Husan.
Samuel F. Hodge.
Chauncey Hurlbut.

*Term expired May 1st, and Elija Smith appointed for 5 years.

1873.

*Chauncey Hurlbut, President. Jacob S. Farrand.
Jno. Owen. Samuel F. Hodge.
Elija Smith.

*Term expired and re-appointed. Elected President, May, 1872.

1874.

Chauncey Hurlbut, President. Jacob S. Farrand.
*Jno. Owen, Samuel F. Hodge.
Elija Smith.

*Term expired and re-appointed.

1875.

Chauncey Hurlbut, President. *Jacob S. Farrand.
Jno. Owen. Samuel F. Hodge.
Elija Smith.

*Term expired and re-appointed.

1876.

Chauncey Hurlbut, President. Jacob S. Farrand.
Jno. Owen. *Samuel F. Hodge.
Elija Smith.

*Term expired and re-appointed.

1877.

Chauncey Hurlbut, President. Jacob S. Farrand.
Jno. Owen. Samuel F. Hodge.
*Michael Martz.

*Elija Smith's term expired and Michael Martz appointed to fill vacancy.

1878.

*Chauncey Hurlbut, President. Jacob S. Farrand.
Jno. Owen. Samuel F. Hodge.
Michael Martz.

*Term expired and re-appointed.

1879.

Chauncey Hurlbut, President. Jacob S. Farrand.
Michael Martz. *Jas. Beatty.
*Jno. Pridgeon.

*Jno. Owen's term expired and John Pridgeon appointed to fill vacancy. Samuel F. Hodge resigned and Jas. Beatty appointed to fill vacancy.

1880.

Chauncey Hurlbut, President. *Jacob S. Farrand.
Michael Martz. Jas. Beatty.
Jno. Pridgeon.

*Term expired and re-appointed.

1881.

Chauncey Hurlbut, President. Jacob S. Farrand.
Michael Martz. *Jas. Beatty.
Jno. Pridgeon.

*Term expired and re-appointed.

1882.

Chauncey Hurlbut, President. Jacob S. Farrand.
*Michael Martz. Jas. Beatty.
Jno. Pridgeon.

*Term expired and re-appointed.

1883.

*Chauncey Hurlbut, President. Jacob S. Farrand.
Michael Martz. Jas. Beatty.
Jno. Pridgeon.

*Term expired and re-appointed.

1884.

Chauncey Hurlbut, President. Jacob S. Farrand.
Michael Martz. Jas. Beatty.
*Jno. Pridgeon.

*Term expired, and Marshall H. Godfrey appointed

1885.

*Jacob S. Farrand, President. Michael Martz.
Marshall H. Godfrey. *Edwin F. Conely.
*Samuel G. Caskey.

*Jas. Beatty died and Edwin F. Conely appointed to fill vacancy.
*Chauncey Hurlbut died and Samuel G. Caskey appointed to fill vacancy.
*Jacob S. Farrand's term expired and re-appointed.

1886.

Jacob S. Farrand, President. Michael Martz.
Marshall H. Godfrey. *Jno. Pridgeon.
Samuel G. Caskey.

*Edwin F. Conely's term expired and Jno. Pridgeon appointed to fill vacancy.

1887.

Jacob S. Farrand, President. Jno. Pridgeon.
Marshall H. Godfrey. Samuel G. Caskey.
*Joseph Nagel.

*Michael Martz term expired and Joseph Nagel appointed to fill vacancy.

1888.

Jacob S. Farrand, President. Jno. Pridgeon.
Marshall H. Godfrey. *Samuel G. Caskey.
Joseph Nagel.

*Term expired and re-appointed.

1889.

Jacob S. Farrand, President. Jno. Pridgeon.
Samuel G. Caskey. Jos. Nagel.
*August Goebel.

*Marshall H. Godfrey resigned January 1, 1889. August Goebel appointed to fill vacancy. Term expired May 1st, and re-appointed.

1890.

Jno. Pridgeon, President. August Goebel.
Joseph Nagel. *Henry M. Duffield.
Samuel G. Caskey.

*Jacob S. Farrand's term expired, and Col. Duffield was appointed to fill vacancy July 9th, 1890; John Pridgeon resigned as President of the Board, on account of ill-health, and Henry M. Duffield was elected to fill vacancy.

1891.

Henry M. Duffield, President. *Jno. Pridgeon.
August Goebel. Samuel G. Caskey.
Joseph L. Hudson.

*John Pridgeon's term expired May 1st, and Frank E. Kirby was appointed for a term of 5 years.

1892.

Samuel G. Caskey, President. Henry M. Duffield.
August Goebel. Joseph L. Hudson.
Frank E. Kirby.

1893.

August Goebel, President. Samuel G. Caskey.
Frank E. Kirby. Henry M. Duffield.
Joseph L. Hudson.

1894.

Henry M. Duffield, President. Frank E. Kirby.
Albert L. Stephens. De Witt H. Moreland.
Edward W. Pendleton.

A. L. Stephens appointed to succeed J. L. Hudson.
D. W. H. Moreland appointed to succeed S. G. Caskey.
Clarence A. Black appointed to succeed August Goebel.
C. A. Black resigned and E. W. Pendleton appointed to succeed him from Dec, 1.

1895.

Frank E. Kirby, President. Albert L. Stephens.
DeWitt H. Moreland. Edward W. Pendleton.
Darius D. Thorp.

1896.

Albert L. Stephens, President.
Edward W. Pendleton.
John P. Huckestein.
Darius D. Thorp.
John W. McGrath.

D. W. H. Moreland resigned to accept Commissionership on Board of Public Works, and J. P. Huckestein was appointed to fill vacancy.

Frank E. Kirby's term expired and J. W. McGrath was appointed to succeed him.

1897.

Edward W. Pendleton, President.
Darius D. Thorp.
James W. Millen.
John W. McGrath.
August Goebel.

August Goebel, appointed to succeed A. L. Stephens. Resigned January 1, 1898, and Joseph J. Noeker was appointed to fill vacancy.

John P. Huckestein resigned and James W. Millen was appointed to fill vacancy

1898.

Edward W. Pendleton, President.
Joseph J. Noeker.
John W. McGrath.
Darius D. Thorp.
James Meathe.

1899.

Darius D. Thorp, President.
John W. McGrath.
Joseph J. Noeker.
*James Meathe.
Edward W. Pendleton.

*James Meathe died September 21st, 1899, and Benjamin Guiney was appointed to fill vacancy.

1900.

John W. McGrath, President.
Joseph J. Noeker.
*Benjamin Guiney.
Edward W. Pendleton.
Darius D. Thorp.

Benjamin Guiney resigned, and John Zynda was appointed to fill vacancy.

1901.

Joseph J. Noeker, President.
John Zynda.
Edward W. Pendleton.
Darius D. Thorp.
Joseph J. Crowley.

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FIFTY-FIRST
ANNUAL REPORT
OF THE
BOARD OF WATER COMMISSIONERS

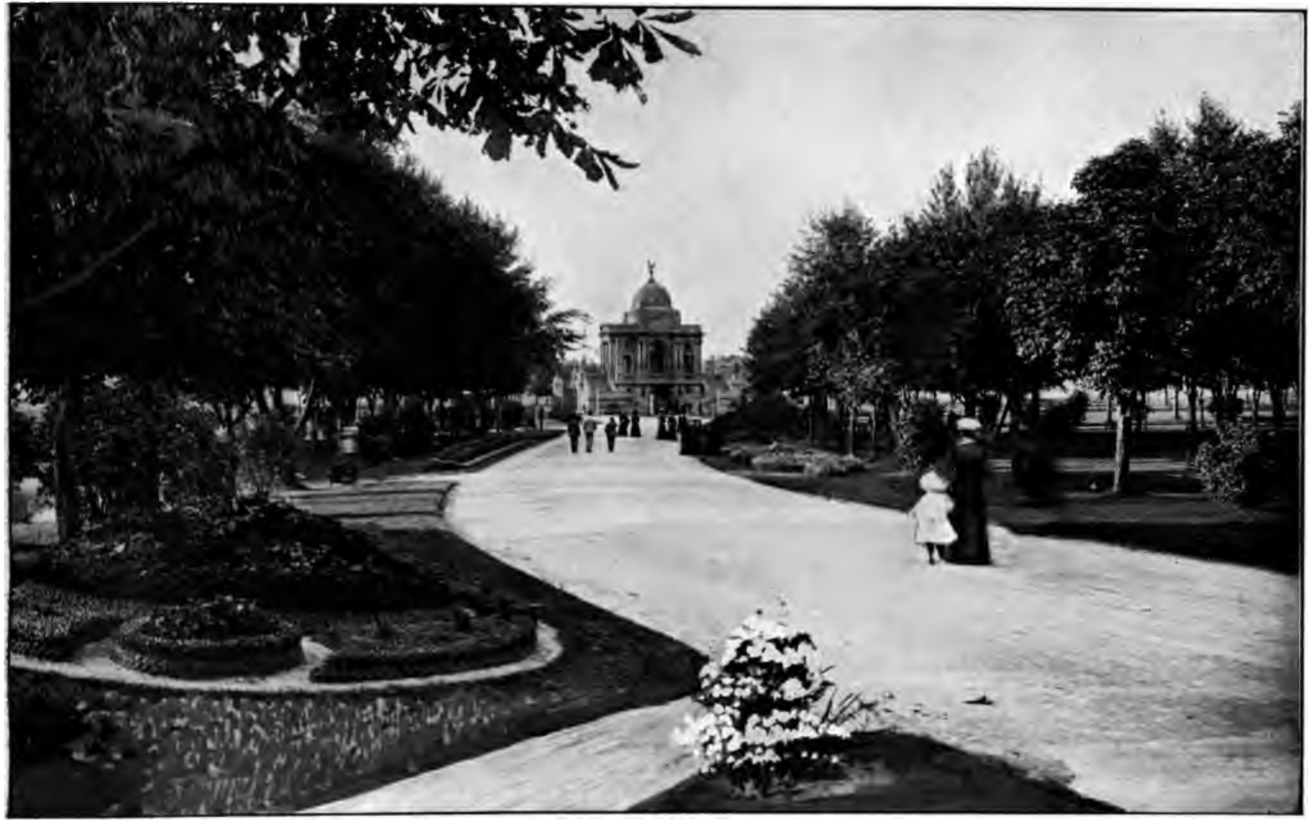
WATER WORKS 1874.

TO THE

COMMON COUNCIL OF THE CITY OF DETROIT

FOR YEAR
ENDING JUNE 30TH
1903.

CALVERT LITHO. CO. DETROIT



PUMPING STATION PARK, LOOKING TOWARDS HURLBUT GATE.

FIFTY-FIRST ANNUAL REPORT

OF THE

BOARD OF WATER COMMISSIONERS

OF THE CITY OF DETROIT

TO THE

COMMON COUNCIL OF THE CITY OF DETROIT,

TOGETHER WITH THE

REPORTS OF THE OFFICERS OF THE BOARD

FOR YEAR

ENDING JUNE 30TH, 1903.

DETROIT FREE PRESS PRINTING COMPANY,
1903.

CONTENTS.

PAGE.

Report of the Commissioners 5

Financial Report of the Secretary 21

Report of the General Manager 39

Report of the Civil Engineer 46

Report of Superintendent of Meters and Inspection 57

Report of Chief Engineer at Pumping Works 68

Report of the Superintendent of Construction 72

Supplement 87

EDWARD W. PENDLETON
PRESIDENT

DARIUS D. THORP
VICE-PRESIDENT

JOSEPH J. CROWLEY

JOHN SCHROEDER

JOHN ZYNDA

BENJAMIN F. GUINEY
SECRETARY

THOMAS R. PUTNAM
SUP'T METERS AND INSPECTION

CLARENCE W. HUBBELL
CIVIL ENGINEER

HARRY S. STARKEY
GENERAL MANAGER

URIAH GOULD
CHIEF ENGINEER PUMPING STATION

JOHN DELANY
SUP'T OF CONSTRUCTION

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Orig. trans.
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BOARD OF WATER COMMISSIONERS

OF THE

CITY OF DETROIT.

MEMBERS:

EDWARD W. PENDLETON, 1904.
JOSEPH J. CROWLEY, 1906.
DARIUS D. THORP, 1905.
JOHN SCHROEDER, 1907.
JOHN ZYNDA, 1908.

COMMITTEES:

Ways and Means	Commissioners CROWLEY, THORP.
Extension and Construction,	Commissioners THORP, ZYNDA.
Pumping Works	Commissioners SCHROEDER, CROWLEY.
Supplies	Commissioners ZYNDA, SCHROEDER.

The President is ex-officio member of each committee.

OFFICERS:

President	EDWARD W. PENDLETON.
Vice-President	DARIUS D. THORP.
General Manager	H. S. STARKEY.
Secretary	BENJ. F. GUINEY.
Superintendent of Construction	JOHN DELANY.
Supt. of Meters and Inspection	THOMAS R. PUTNAM.
Civil Engineer	CLARENCE W. HUBBELL.
Chief Engineer at Pumping Works	URIAH GOULD.
Bookkeeper	W. W. WILCOX.
Receiving Clerk	GEORGE E. KUNZE.
Cashiers	S. G. ROOD. CHARLES W. KEENA.
Meter Clerk	GERALD P. MONAGHAN.
Permit Clerk	WM. L. WALLACE.
Collectors	FRANK PETZ. WM. W. MONAGHAN. ANTHONY VOGEL ANTHONY J. LOOK THOS. DALTON. JOHN J. ROBINSON. M. A. DETTLING. THOMAS J. CLANCY. JOHN C. BECKER.
Supt. Storage Grounds	JOHN REHE.

THE BOARD OF WATER COMMISSIONERS

OF THE

CITY OF DETROIT.

RATES JULY 1, 1900.

METER RATES.

Payable Quarterly.	QUARTERLY
First 30,000 gals	$1 75
All in excess of 30,000 gals	2¼ cts. per M.
Minimum Rate	1 75

ASSESSMENT RATES.

	PER ANNUM
For Family, household purposes	$2 60
Additional Families to first, in same house supplied through same faucet, each family	1 40
Green Houses.—Special rates.	
Private Stable, for each horse	1 20
Livery Stables, “ “ “	1 20
Dray and Team Horses, each	60
Cows, each	60
Stores and Offices, from	$1 00 to 12 00
Bakeries, average daily use for each barrel of flour	2 00
Groceries and Provision Stores, from	$3 00 to 50 00
Saloons, from	6 00 to 50 00
Bar, with faucet, from	8 00 to 50 00
Fish Houses, from	6 00 to 50 00
Beer Pump	2 00
Barber Shops, each chair	2 00
Slaughter Houses.—Special rates.	
Hotels and Taverns, in addition to family rate, each room	60
Boarding Schools, from	$4 00 to 50 00
Printing Offices.—Special rates.	
Butcher Stalls, each not less than	3 00
Workshops, for 10 persons or under	3 00
“ for each additional 10 persons	1 00
Boarding Houses, in addition to family rate, each boarder or roomer,	40
Estimated quantities of water each 1,000 gallons	07
Building Purposes, each 1 M brick	03
“ “ “ 100 yards plastering	05
“ “ “ perch stone	01
“ “ minimum	50

FIXTURES.

Bath Tub, for families, 1st tub	$1 00
“ “ each additional tub	60
“ “ public, each tub	4 00
Automatic Water Closets, for family, 1st closet	1 60
“ “ “ each additional	60
“ “ “ for hotels, stores, factories, etc., for 10 persons	2 00
“ “ “ each additional person	20
Rod Water Closets, not less than	6 00
Urinals, not less than	2 00
Wash Hand Basins, for family, each	50
“ “ “ for other purposes, each person	15
Hose Bibb or Connection, premises 30 feet front or less	60
“ “ “ “ 30 feet to 60 feet	80
“ “ “ “ 60 feet to 100 feet	1 60
Special Rates for larger grounds.	
Fountains	$5 00 to 20 00
Street Sprinklers, each wagon	50 00

Where there is a waste of water an increase of rates will be made.

FIFTIETH ANNUAL REPORT

OF THE

BOARD OF WATER COMMISSIONERS

OF THE

CITY OF DETROIT.

To the Honorable the Common Council of the City of Detroit:

GENTLEMEN—The Board of Water Commissioners of the City of Detroit respectfully submits herewith its fiftieth annual report, for the fiscal year ending June 30th, 1903.

The first annual report submitted to the Common Council by this Board bears date, December 31st, 1853, which, on account of its historic interest, is appended to this report, together with a table of assessment of water rates.

The figures of this original report form an interesting contrast to the present conditions at the close of the first half-century.

The total receipts for the last year were $607,577.83, the sum of $25,447.39 being received for pipe laid outside of the city, in the villages of Delray, Woodmere, Hamtramck and River Rouge.

The total expenditures for the year were $766,495.84, of which the sum of $517,854.03 was expended for construction, $127,204.14 for operation and maintenance, $59,909.91 for interest, $5,527.76 under Hurlbut will, and $56,000 on bonded indebtedness.

The total number of families on the assessment rolls July 1st, 1903, was 67,280, an increase of 2,549 from July 1st, 1902.

Since our last report the addition to the engine house has been completed, and the two high-pressure engines have been erected and steam has been turned on, but they are not yet fully tested and ready for duty. Fortunately for economy in construction and for the rapidly increasing demands, the enlargement of the plant was determined upon some three years ago. The great expense incurred is fully justified in the City's growth, and especially in the rapid increase in manufacturing plants, with extraordinary demands for fire protection. The total mileage of pipes is now 617. The amount of water pumped during the year was 18,757,682,360 gallons.

The average daily consumption per capita being 150 gallons. Fifty years ago the daily per capita consumption was 22 gallons.

After making every allowance it must be admitted that an immense amount of water is wasted and the time will come when some means must be adopted to prevent this waste. Many large cities, notably Milwaukee and Cleveland, are adopting the general use of the meter system, with excellent results.

The decision of the Supreme Court, granting the Detroit United Railway Company free water for sprinkling between the tracks, imposes an extra burden upon the water rate payer. This is in addition to the requirement of furnishing water for the Fire Department, the Park and Boulevard Commission, all municipal buildings and the public schools.

The entire city is benefited by this general use of water, and it is a discrimination to tax water consumers only and not the entire property of the city, for these public benefits.

The plans and specifications are completed for the proposed tunnel, ten feet in diameter, extending under the river to the head of Belle Isle, a distance of 3,160 feet.

This location for obtaining the purest possible water supply was recommended by the Board of Health after a careful examination of all the conditions and a most thorough investigation extending through a number of years, by this Board.

The fiftieth anniversary of this Board is appropriately marked by the extensive addition to the plant, consisting of the enlargement of the pumping station, the installation of two engines, the construction of a 42-inch distribution main and the proposed tunnel under the river.

The entire plant today represents a conservative valuation of $7,076,946, with an indebtedness of $1,023,000.

This is a gratifying summary of a stewardship extending over a period of fifty years. The first report of the Secretary indicated a deficit of $85,125.09.

Your attention is called to the reports of officers of the Board submitted herewith. The financial transactions having been examined by an expert accountant, and approved.

All of which is respectfully submitted.

EDWARD W. PENDLETON,
DARIUS D. THORP,
JOSEPH J. CROWLEY,
JOHN SCHROEDER,
JOHN ZYNDA.

Dated, Detroit, July 1st, 1903.

Reprint of Report of the First Board of Water Commissioners of the City of Detroit, 1853.

REPORT.

OFFICE OF WATER WORKS,
Detroit, Dec. 31, 1853.

To the Hon. Common the Council of the City of Detroit:

GENTLEMEN—The undersigned Board of Water Commissioners of the City of Detroit, respectfully submit their first Annual Report, together with the Reports of the Superintendent and Engineer, and Secretary; also, a Report of Professor S. H. Douglass, upon the analyses of waters.

Extensive repairs, and many improvements, heretofore neglected for want of means, have been made, in the different departments of the works; and, while we know that their capacity is entirely inadequate to the demands made upon them, by a rapidly increasing population, we are satisfied that they are not only in a much better state of efficiency than they have been for years previous, but that they would, ere this, have been almost entirely useless, had not the Council adopted and secured a policy of management different from that formerly pursued. Notwithstanding the better advantages furnished, it has been only with the most constant and untiring efforts that the works have been kept up at all.

In the construction of the works, not as much has been accomplished as might have been wished; but the late day at which we were enabled to effect the loan authorized by the Legislature last winter, rendered it almost impossible to do more.

Seven and a-half miles of iron pipe have been laid, fifty-four new fire hydrants erected, and twenty-nine additional stop-cocks put in.

For full details in regard to the work accomplished in the above departments, we refer you to the Report of the Superintendent and Engineer, in which is also included a brief history of the works from their commencement.

The following is an exhibit of the expenditures and receipts during the thirteen months that have elapsed since our last Report as Trustees:

EXPENDITURES.

For construction	$102,909 56
For expenses and repairs	12,398 86
Miscellaneous:	
Amounts paid on outstanding Water Certificates, per centage to Collectors, Service Cocks, Bartholomew Hydrants, Interest, Water Rates refunded, and paid City Treasurer	2,478 78
	$117,787 20

RECEIPTS.

From Water Rates	$25,482 48
Miscellaneous	2,778 05
	$28,260 53

To this date the works have cost the citizens the sum of $355,240.31, as follows:

Expended by the Common Council, over and above receipts	$266,141 02
Expended by the Trustees and Commissioners, over and above receipts	89,099 29
	$355,240 31

For statements in detail, we would refer you to the accompanying Report of the Secretary.

We would also call your special attention to the able Report of Prof. S. H. Douglass, submitting the results of his analyses of waters. The comparisons therein made exhibit, in a most satisfactory light, the purity of the water of the Detroit river, and fully show the unwholesome and dangerous qualities of water obtained from wells, which are supplied from the surface water of the clay soils. The inference is inevitable that many of the wells now in use in this city furnish water of like impurity.

From a thorough examination of the subject, induced by the results of careful surveys, and after much deliberation, ever keeping in view the future growth and wants of the city, we became convinced that the lot upon Prospect street, purchased by your honorable body in 1851, as a site for a new reservoir, was not as desirable a location as was required for that purpose; and we have therefore purchased out-lot number six upon the Dequindre farm, at the head of Orleans street, adjoining the track of the Detroit and Pontiac Railway.

The following are the advantages gained, and are our reasons for making the purchase:

The lot has an elevation of five feet more than the one upon Prospect street. With reservoirs of equal heights, this would, therefore, give five feet additional head. With the same top-water line assumed, a reservoir of larger capacity can be provided, and the cost of the construction of five feet of the base saved.

A straight pump main from the Engine House will now be obtained, thus avoiding three right angle bends which would have been necessary in the use of the other lot, and thereby saving an expenditure of power required to overcome the friction of passing a given quantity of water through these bends.

Being adjacent to the track of the Detroit and Pontiac Railway, better means can be provided for furnishing and delivering materials for constructing the reservoir.

The lot having a greater breadth, a better form, and a greater capacity can be given to the reservoir.

A reservoir of the capacity at present needed would cover the whole of the Prospect street lot; while but a portion of the new lot will be required, and the remainder can be used for additional reservoirs, as the growth and wants of the city may require.

Respectfully submitted,

E. A. BRUSH,
SHUB'L CONANT,
HENRY LEDYARD,
JAMES A. VAN DYKE,
W. R. NOYES.

Recapitulation of the Assessment of Water Rates for the Year commencing July 1st, 1853, and ending June 30th, 1854.

Water Assessment, July 1st, 1853.	Number of Families.	Stores.	Taverns.	Groceries.	Offices.	Mechanic Shops.	Foundries and Machine Shops.	Livery Stables.	Bakeries.	Breweries.	Saw Mills.	Printing Offices.	Railroad Depots.	Tobacco Factories.	Flour Mills.	Churches.	Confectionaries.	Halls.	Banks.	Tanneries and Morocco Factories.	Rectifying Distilleries.	Plaster Mill.	Stone Yards—Marble Works.	Burr Mill Stone.	Dye House.	Small Beer and Soda.	Saleratus Factory.	Gas Works.	Soap Factories and Asheries.	Glue Factories.	Sash and Door Furniture Factories.	Amount of Assessment.
First Ward.......	615	37	15	41	12	39	4	3	3	1	...	1	1	1	1	4	...	...	...	....	...	...	1	...	...	...	...	..	....	...	....	$4,914
Second Ward. ..	190	175	12	60	125	76	2	5	2	2	...	6	...	2	...	7	4	7	5	1	1	1	1	1	...	1	...	..	2	...	....	3,768
Third Ward.......	503	20	4	30	.....	36	3	1	4	1	2	...	1	...	...	3	2	1	...	2	...	...	2	...	2	1	...	...	4	1	3	3,927
Fourth Ward.....	770	2	1	35	.....	12	2	....	3	2	...	1	...	...	...	4	...	...	...	1	...	...	..	...	1	1	...	...	1	...	....	3,843
Fifth Ward.......	528	17	3	12	2	11	....	....	1	....	...	...	...	...	..	1	...	...	...	1	...	...	2	...	..	1	1	..	1	...	1	2,807
Sixth Ward.......	613	14	3	8	.....	17	....	1	2	2	...	...	...	...	...	2	1	...	...	....	...	...	...	...	...	..	...	...	....	...	1	3,605
Seventh Ward....	634	8	...	20	....	4	2	....	....	3	4	...	...	...	...	1	...	...	...	1	...	...	...	...	1	1	...	...	2	...	3	3,531
Eighth Ward.....	430	4	3	15	.....	3	....	....	....	1	...	...	...	...	...	1	..	...	...	....	1	...	..	.	...	...	...	1	....	...	....	2.222
Total	4,283	277	41	221	139	198	13	10	15	12	6	8	2	3	1	23	7	8	5	6	2	1	6	1	4	5	1	1	10	1	8	$28,617

One Theatre. One Jail. One Hospital. Two Orphan's Homes. Total number of assessments, 5,323.

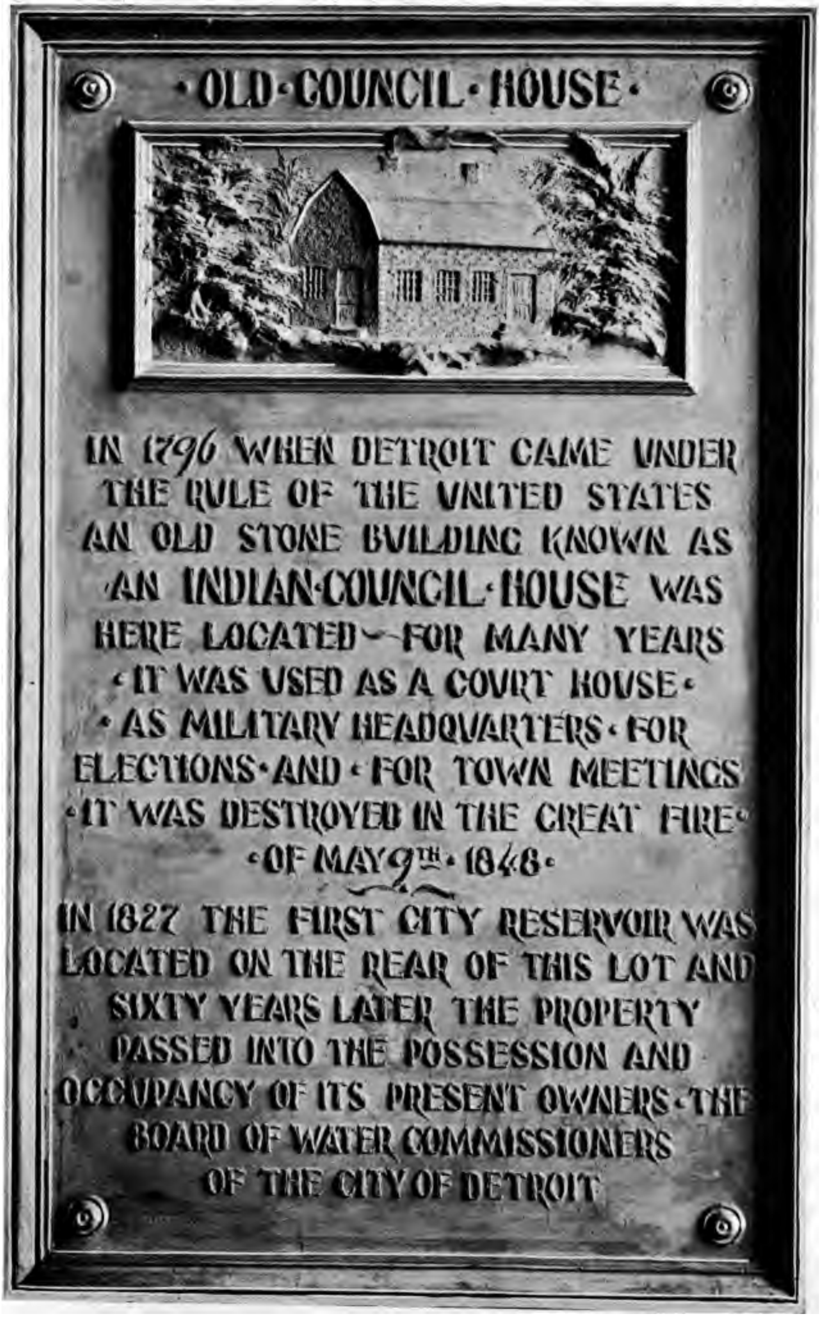
HISTORIC SKETCH.

The act creating the Board of Water Commissioners of the City of Detroit was passed by the Legislature of the State of Michigan on February 14th, 1853. This act, with its amendments, is in force at the present time. And it seems appropriate that the fiftieth anniversary report should contain a brief sketch of this oldest municipal department.

The Great Lakes, always full to the brim, but never overflowing, with no ebb or flow of tide or fluctuation from draught or freshet, afford, for all time, an unfailing and uniform supply of water. This natural advantage combined with wise and economical administration have given to Detroit an unlimited supply at less expense than any other city in the United States. The development of the water system—like an hydraulic gauge—accurately marks the expansion and prosperity of the City.

The early *habitants,* settling along the river bank, did not lack for an abundance of water ready at hand in every front yard. As the town grew the inconveniences of civilization increased, and regulations multiplied. Every householder was compelled to have his fire bucket well filled and always ready for an alarm. A tax of one dollar was imposed for the privilege of taking water from the wharf. Then, for greater convenience, certainly not for better water, public wells were provided and the town pump had its day.

On June 1st, 1822, the first public meeting was called for the purpose of considering some method of furnishing a



· OLD · COUNCIL · HOUSE ·

IN 1796 WHEN DETROIT CAME UNDER
THE RULE OF THE UNITED STATES
AN OLD STONE BUILDING KNOWN AS
AN INDIAN · COUNCIL · HOUSE WAS
HERE LOCATED — FOR MANY YEARS
· IT WAS USED AS A COURT HOUSE ·
· AS MILITARY HEADQUARTERS · FOR
ELECTIONS · AND · FOR TOWN MEETINGS
· IT WAS DESTROYED IN THE GREAT FIRE ·
· OF MAY 9TH · 1848 ·

IN 1827 THE FIRST CITY RESERVOIR WAS
LOCATED ON THE REAR OF THIS LOT AND
SIXTY YEARS LATER THE PROPERTY
PASSED INTO THE POSSESSION AND
OCCUPANCY OF ITS PRESENT OWNERS · THE
BOARD OF WATER COMMISSIONERS
OF THE CITY OF DETROIT

MEMORIAL TABLET ON OFFICE BUILDING.

general supply of water. This meeting was held in the "Old Council House," occupying the site of the present water office, corner of Jefferson avenue and Randolph street. But it was not until August 5th, 1824, that any definite action was taken. On that date an act was passed by the Governor and Legislative Council of the Territory of Michigan "authorizing Peter Berthelet to erect a wharf on Detroit River in continuation of Randolph street, and running to the Ship Canal of said river, provided, that the said Peter Berthelet, his heirs and assigns, shall, at all times during the existence of the above grant, at his own, or their expense, erect, make and keep in repair, at some convenient place, at or near the end of said wharf, next the channel of the river, a good and sufficient pump, at which all persons who may reside within the City of Detroit, shall be at all times, free of wharfage or other expenses, entitled to take and draw water for their use and convenience and for that purpose a free use of said wharf shall be given for carts, wagons, sleighs or other machinery to be used in drawing and carrying away the water."

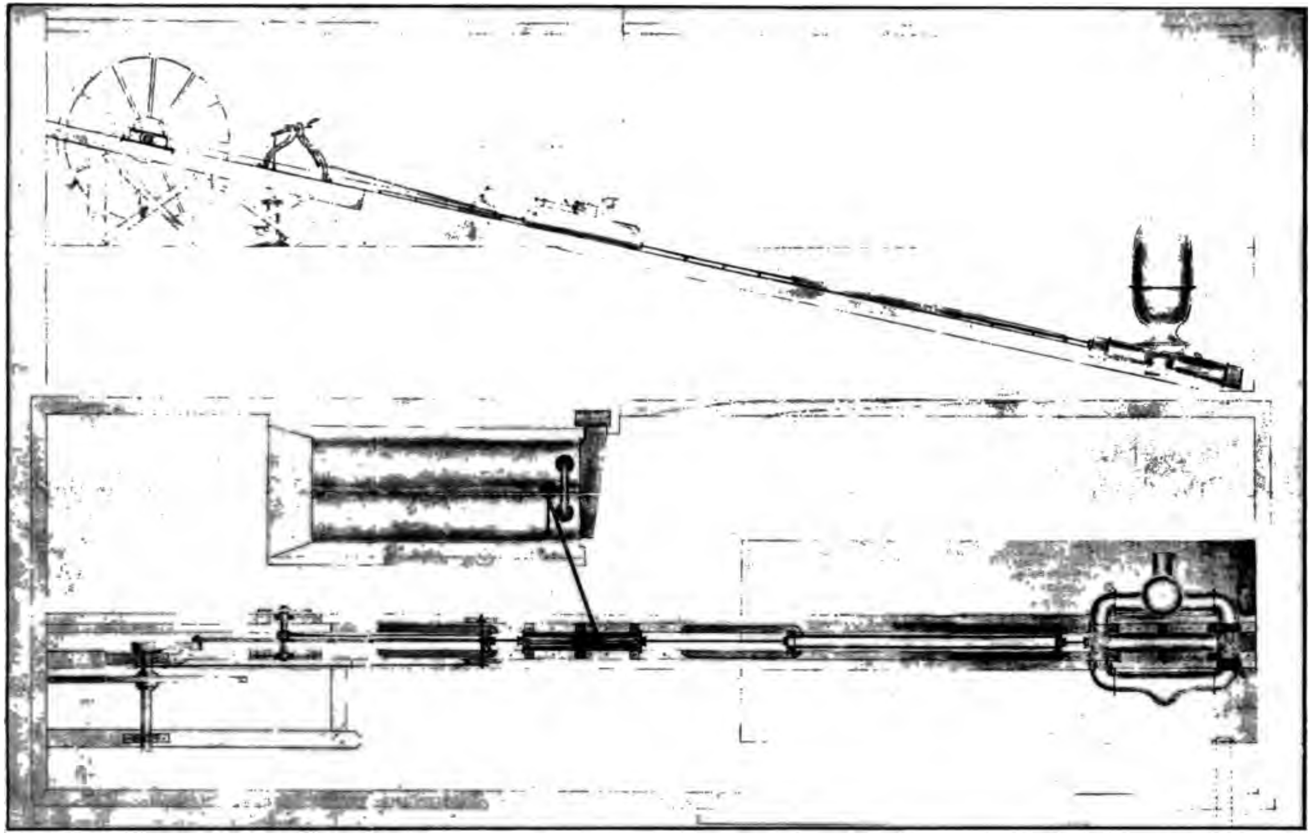
On February 2nd, 1825, the Common Council passed an act "granting to Bethuel Farrand and his legal representatives, the sole and exclusive right of watering the City of Detroit, and for other purposes." This right was soon afterwards transferred to Rufus Wills who erected a pump house at the foot of Randolph street—a frame building twenty feet square with a cupola at the height of forty feet containing a 40-gallon cask, to which water was raised by two pumps of 5-inch bore. From this cask water was conveyed in tamarack logs, 4½ inches inside diameter, to a reservoir on the present location of the Water Office. This reservoir was sixteen feet square and six feet deep, with a capacity of 9580 gallons. The city at this time contained 1,500 inhabitants.

On June 3rd, 1829, the Common Council granted the privilege of furnishing water to the city, to extend to the year 1850, to Rufus Wills, Phinias Davis, Jr., Lucius Lyon and A. E. Hathon. At this time an impression obtained that the water from the river was not pure and wholesome, and a committee was appointed by the Common Council for the purpose of boring a well and designating a proper site for a reservoir. This committee consisted of Mayor Jonathan Kearsley and Alderman Thomas Palmer. Upon their recommendation a lot was selected on the south side of Fort street between Shelby and Wayne streets, and the boring of the proposed well was undertaken. It was four inches in diameter, and after going to the depth of two hundred and sixtv feet was abandoned.

On the 29th of June, 1830, an act was passed by the Common Council giving to the same parties named in the last act the exclusive right to supply the city with water, with enlarged rights and privileges, extending to the year 1865, at which time all the property, effects, and rights of the company were to be surrendered to the Common Council on payment "by the said Common Council what shall at that time be the estimated value of the same." The same year this company constructed a reservoir on the lot on Fort street, between Shelby and Wayne streets, with a capacity of 21,870 gallons. The water was forced into this reservoir through a 3-inch iron pipe extending into the river, a ten-horse power engine being used driving a rotary pump. The city was supplied from the reservoir through two three-inch log pipes. This company afterwards became known as the Detroit Hydraulic Company.

In 1831 a second reservoir was constructed by this company with a capacity of 120,000 gallons. A new engine house was erected on the north side of Woodbridge street, between Cass and Wayne streets, in which was installed a twenty-horse power engine. This company became financially involved and on June 4th, 1836, the city purchased the entire plant for the sum of $20,500.00.

In 1837 a reservoir was built at the foot of Orleans street of iron structure, by Noah Sutton, who also erected a



PUMP AND BOILER, 1831.

new engine house and a forty-five horse power engine, and also laid nine miles of tamarack log pipe and four and one-half miles of iron pipe. This plant was accepted by the Common Council on the 3rd day of June, 1841, on recommendation of a committee consisting of Matthew Gooding and Chauncey Hurlbut. The city was supplied by this plant for a period of upwards of ten years. The supply, however, was inadequate, and although the schedule of rates was burdensome, a deficit in the treasury of the Water Department had been gradually increasing until it amounted to the sum of $85,125.09. Some radical change was necessary, and on February 24th, 1852, the control and management of the Water Works was vested in a Board of Trustees, consisting of five members, Shubael Conant, Henry Ledyard, Edmund A. Brush, James A. Van Dyke, and William R. Noyes.

On February 14th, 1853, the State Legislature passed an act creating the trustees above mentioned and their successors a "Board of Water Commissioners of the City of Detroit." This act, with its amendments, is in force at the present time.

The first superintendent was Jacob Houghton, Jr., who states in his report of 1854, "There now is an excessive waste going on, and the quantity of water distributed during the last month has reached the maximum of over one million of gallons per day, or twenty-seven gallons a day to each inhabitant." This forms an interesting comparison with the conditions of to-day, the maximum amount pumped in twenty-four hours being eighty-one million gallons, with the average daily consumption throughout the year of 157 gallons per capita.

The members of this first Board of Water Commissioners, whose names and memories are now held in high regard, looked forward, from the middle of the century, with confidence to the time when Detroit should be a commercial and manufacturing metropolis. Under the enlarged powers that were given by the Legislature they determined to provide ample appliances and methods for every possible increase of demand. The reservoir was accordingly constructed on Orleans street, corner of Erskine, divided into two basins, each 200 feet square at top, 114¼ ft. square at bottom and 28½ ft. deep; the base area of reservoir covering about four acres, with capacity of 10,000,000 gallons.

The location of this reservoir, remote from the river, and on the extreme outskirts of the city, was a challenge to the conservative ratepayer of the time. So bold and expensive a venture was a confirmation in the minds of many that this first experiment in the organization of a Board of Water Commissioners would be a warning for all time.

A Cornish pumping engine was erected at the foot of Orleans street at an expense of fifty thousand dollars, with a power and capacity of pumping three million gallons in twelve hours to the reservoir, a distance of about a mile and a half.

There was also constructed in connection with this plant, a brick tower and iron tank.

So rapid, however, was the growth and increased demands of the city that in less than twenty-five years it became absolutely necessary to construct an entire new plant. In 1873, under the authority of an act of the Legislature, bonds were issued for the purchase of property and the erection of a new plant. The site selected was known as a portion of private claim 337 and 357, running from Jefferson avenue to the channel bank of the river. During the last thirty years extensive additions and improvements have been constantly made, keeping pace with the demands, and to-day the water works system of Detroit represents an aggregate valuation of seven million, seventy-six thousand eight hundred and forty-six dollars. There is a bonded indebtedness of one million and twenty-three thousand dollars.

This entire plant has been built up and paid for out of the water rates, excepting an annual appropriation of $75,000.00 by the city, from 1873. Since this appropriation began the fire department has had "free water," and now water is furnished without charge to all municipal departments—and as between the Water Department and the City, the latter is really the beneficiary of the former.

The pumping station proper is a brick building with tile roof 312 feet in length and 76 feet in width. The pumping capacity is represented by four engines, two compound beam, each of twenty-four million gallons daily capacity, one compound beam of thirty million, and one Allis triple-expansion of twenty-four million. Two additional Allis triple-expansion engines, twenty-five million gallons each, are now being installed. The average water pressure in the City is twenty-three and a half pounds, at the pumping station fifty and thirty-hundredths pounds. The pressure in the northern and higher sections has been insufficient, and the city has been divided into high and low pressure districts. The division has been made on a contour line fifty feet above the mean elevation of the river. The boiler room adjacent to the engine house is two hundred and five feet in length and forty-five feet in width. There are three batteries of boilers, as follows: Four vertical water-tube, two hundred and twenty-five horse power each; four horizontal fire tubular, one hundred horse power each; and four horizontal water tubular, two hundred and twenty-five horse power each. There are two coal sheds, each 170 feet by 73 feet in size, with a storage capacity of ten thousand tons. Coal is unloaded directly from vessels in the canal by underground conveyance system. There are three conduits or intake pipes, of boiler iron, one fifteen hundred feet in length, six feet in diameter; one fifteen hundred feet of five feet diameter, and one one thousand feet of six feet diameter. The settling basin is 775 feet in length by 375 feet in width and 16 feet in depth. From the basin to the pumps extend four five-foot brick conduits with strainer wells and branches complete. There is also one six-foot brick conduit running directly from the easterly intake pipe outside the settling basin to the pumps. There are four 42-inch mains extending from the pumps into the city aggregating fourteen and one-fifth miles in length, and there are six hundred seventeen and a half miles of distribution mains of various sizes, sixty-nine miles being outside of the present corporate limits.

A shore tunnel, ten feet inside diameter, has already been constructed, extending to a shore shaft a distance of 1,032 feet. Plans and specifications have been prepared for a river tunnel ten feet inside diameter extending a distance of 3,160 feet to a point near the head of Belle Isle, where a surface intake crib will be located.

The water tower, one hundred and seventy-six feet in height, was originally used in connection with the reservoir on Orleans street for the purpose of regulating the pressure, and it continued to be used for the same purpose until 1896, when there was substituted relief valves at the pumps, with more efficient results, the water being supplied by direct pressure to the mains.

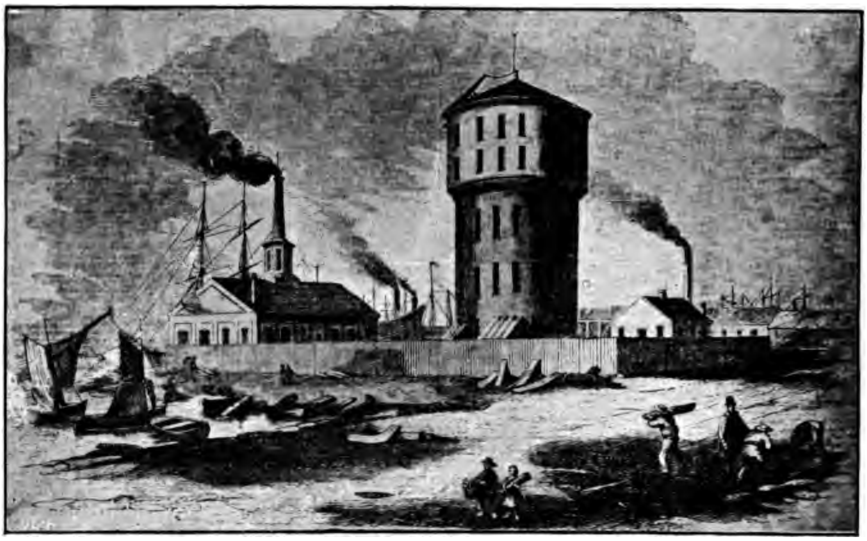
There are 7,382 gates throughout the system, from four inches to forty-two inches in size.

The premises known as the storage grounds adjacent to the old reservoir site on Erskine street, is utilized for the storage of pipe and general material required for the works. This lot has a frontage on Erskine street of 601 feet and a depth of 316 feet.

The building occupied for the offices of the Board is known as Lot 12, Sec. 4, Governor & Judges' Plan, on the corner of Jefferson and Randolph street.

The employees of the Board at this time, not taking into account the laboring men, number in all one hundred and sixty-six, in the following departments: Office force, 26; Engineering Department, 9; Meter Department, 8; Pumping Station, 28; Inspection, 23; Iron Pipe Department, 69; Library under the Hurlbut fund, 3.

Of this force of one hundred and sixty-six, there have been in the employ of the Board for thirty years and upwards,



1848 - 1858.

1858 - 1874.

five men; for twenty-five years and upwards, six men; for twenty years and upwards, fifteen men; for fifteen years and upwards, twelve men; for ten years and upwards, twenty-six men. From three to ten years, sixty-six men and for less than three years, thirty-six men.

No one has been so closely indentified with the water system of Detroit as Mr. Chauncey Hurlbut. His name first appears upon the Committee appointed by the Common Council in 1841, in connection with the acceptance of the plant that was then constructed. He was Chief Engineer of the Fire Department from 1837 to 1842, at a salary of $100 per year. The following letter written by him, at that time, illustrates his public spirit:

"Detroit, March 3rd, 1841.

"John Owen, Esq., Prest. Fire Dept., of the City of Detroit:

Dear Sir—Enclosed you will find a warrant on the City Treasurer for $100.00, which I received for services as City Engineer. Being a believer in Franklin's doctrine that no man should grow rich by emoluments of office, I remit the warrant to you for the benefit of the Fire Department.

Very respectfully yours,

CHAUNCEY HURLBUT."

At the time of his death in 1885, at the age of 82, he had served as Water Commissioner for a period of 17 years. He left a bequest of about two hundred thousand dollars, nearly his entire property, for the benefit of the Board, the income from the bequest to be devoted to the improving and beautifying of the Pumping Station park. He also left his private library to the Board, which has become the nucleus of a scientific reference library and has been constituted the first branch of the Public Library of the City. The memorial gate was erected in commemoration of the devotion and liberality of Mr. Hurlbut.

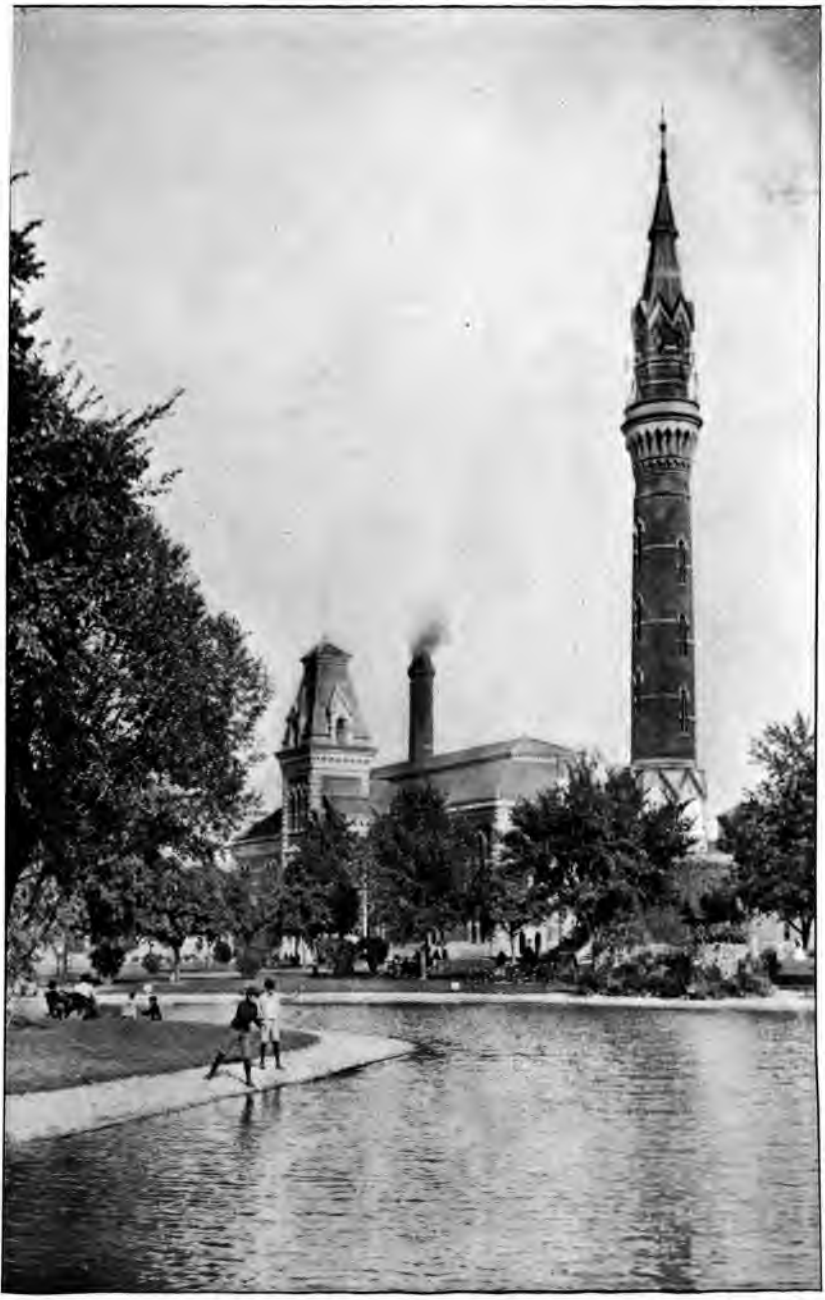
The grounds are carefully laid out with ornamental shrubbery and lagoons, making a most attractive recreation ground, and acknowledged to be the most beautiful pumping station park in the country. Its dimensions are ten hundred and sixteen feet fronting on Jefferson avenue, with a mean depth of two thousand seven hundred and fifteen feet to the river.

Careful and frequent analyses by the Board of Health indicate that the quality of water supplied to the City is pure and wholesome. The prevalence of typhoid fever is usually attributed to impurities in water, and statistics covering a series of years show that Detroit has suffered least from typhoid of any of the Lake cities.

The present members of the Board of Water Commissioners of the City of Detroit review with pride the history of the oldest municipal board during its existence of half a century, and we commend to our successors the all-important interests affecting the health and prosperity of the City that are inseparably associated with the wise and faithful management of its affairs.

EDW'D W. PENDLETON.
President.

Dated, Detroit, July 1st, 1903.



1874.

REPORT OF THE SECRETARY.

Detroit, Mich., July 1st, 1903.

To the Board of Water Commissioners of the City of Detroit:

GENTLEMEN—I have the honor to submit the Secretary's report for the year ending June 30th, 1903.

There is at the present time in the City of Detroit according to the records of this office, an estimated population of 339,590, an increase of 13,412 since June 30th, 1902.

On December 27th, 1902, the sum of fifty thousand dollars, and on February 17th, 1903, the sum of twenty-five thousand dollars were transferred from the Sinking Fund to the General Fund. These amounts were returned to the Sinking Fund on January 28th, 1903, and on April 16th, 1903, respectively.

The following is a detailed statement of the receipts and disbursements:

Receipts.

Water Rates		$398,290 81
Percentage		5,450 25
Shutting off and letting on		228 25
Plumbers' license Account		537 75
Service cocks, permits	$ 7,172 75	
Service cocks, material and labor	155 00	7,327 75
City of Detroit, general tax levy		75,000 00
Bills payable		25,000 00
Bonded indebtedness, bonds sold		50,000 00
Premium on bonds sold		4,375 00
Repairing leaks		135 99

Meter account, material and labor		$ 636 34
Meter repairs, material and labor		52 80
Iron pipe, material and labor	$15,077 65	
Iron pipe, bonuses	2,160 53	17,238 18
Real estate revenue and expense		1,769 92
Engineering sale of material		80
Village of Woodmere		13,569 00
Hurlbut Fund, from trustees	4,000 00	
Hurlbut Fund, pay roll	7 00	
Hurlbut Fund, interest on daily balance	38 05	4,045 05
Interest account, general interest on daily balance		1,487 23
Interest Account, sinking fund balance		2,069 22
Pumping Works, sale of material		218 85
Horse and wagon, sale of horse		25 00
Pumping water, sale of material		119 64
Total receipts		$607,577 83

Disbursements.

OPERATION AND MAINTENANCE.

Office Account—		
Manager, secretary and clerks	$ 22,621 80	
Watchmen and janitors	2,025 00	
General work and carpenter	1,422 22	
Scrubbing	159 00	
Books, printing, stationery and binding	711 95	
Printing annual reports	219 30	
Telephones	231 00	
Advertisements and subscriptions	156 99	
Postage and stamped envelopes	236 44	
Towels	71 50	
Premium on guarantee bonds	60 00	
Street car tickets	15 00	
Rubber stamps	11 15	
Disinfectant	11 00	
Ice	56 10	
Gas	3 22	
Horse care	178 00	
Horse shoeing	25 50	
Legal services	306 15	
Miscellaneous	97 39	
		$ 28,618 71

Inspection Account—		
Inspectors and clerks	$ 7,053 87	
Street car tickets	195 00	
Express charges	2 80	
Electric lamp supplies	15 50	
Miscellaneous	4 50	
		$ 7,271 67
Plumbers' License Account—		
Printing	$ 18 00	
		$ 18 00
Percentage Account—		
Labor	$ 6,553 90	
		$ 6,553 90
Pumping Water Account—		
Engineers, firemen, etc.	$ 27,169 25	
Coal	19,756 21	
Unloading coal	2,727 76	
Boiler and engine supplies	457 94	
Engine oil	327 57	
Kerosene and gasoline	4 75	
Waste, packing and rags	450 81	
Electric light supplies	6 07	
Boiler inspection and insurance	326 00	
Ice	21 75	
Telephone	51 28	
Printing and stationery	22 50	
Repairs to boilers and engines	1,317 63	
Paint, oil and glass	42 08	
Feed and bedding	11 75	
Horse shoeing	8 00	
Lumber	14 00	
Repairs to coal unloading apparatus	403 00	
Tools	25 38	
Freight and express charges	1 62	
Hose and couplings	21 24	
Advertising	20 23	
Miscellaneous	72 32	
		$ 53,259 14
Repairing Leaks Account—		
Superintendent, clerks, watchmen and labor	$ 3,471 10	
Horse care	180 00	
Horse shoeing	16 50	
Harness, wagon supplies	99 25	
Paving blocks and lumber	17 10	
Telephone	24 00	

Repairs and rubber boots	$ 9 40	
Tools and repairs	13 58	
Paint and oil	1 50	
Pavement repairs and inspection	231 15	
Pump repairs, hose and couplings	82 88	
Printing and stationery	10 70	
Miscellaneous	39 60	
		$ 4,196 76
Meter Repairs and Expense Account—		
Labor	$ 1,070 00	
Fittings	513 80	
		$ 1,583 80
Service Connections Account—		
Labor	$ 11,156 98	
Service cocks, sleeves and valves	3,209 92	
Car fare	190 00	
Telephone	24 00	
Tools and repairs	300 95	
Stationery	69 50	
Oil	1 90	
Freight and express charges	7 19	
Harness repairs	75	
Rubber boots and repairs	9 40	
		$ 14,970 59
Office Furniture and Fixture Account—		
Furniture repairs	$ 5 80	
Lamps and fixtures	9 29	
Boiler inspection	1 50	
Fire alarm	20 00	
		$ 36 59
Horse, Wagon and Harness Account—		
Harness and repairs	$ 340 90	
Wagon repairs	341 92	
Lumber	55 63	
		$ 738 45
Real Estate, Revenue and Expense Account—		
Cement, brick, new building, storage yard	$ 626 62	
Lumber, new building, storage yard	909 12	
Stone sills and ironwork	93 17	
Storage yard repairs	86 38	
Furnace repairs, storage yard	66 82	
Siding repairs, storage yard	44 08	
Roof repairs	131 88	
Nails and fittings	104 76	

Paint, oil and glass	$ 247 14	
Electric fixtures	270 05	
Insurance premium	133 65	
Coal	483 82	
Gas fixtures and pipe, office	48 50	
Lumber and general repairs	72 41	
Scales, storage yard	105 00	
		$ 3,423 40
Water Rates Account—		
Refund	$ 26 48	
		$ 26 48
Pumping Works Grounds Account—		
Superintendent and labor	$ 4,581 26	
Tools and fittings	16 34	
Paint, oil, etc	4 44	
Ice	7 50	
Horse shoeing	6 00	
Setting up booth	22 82	
		$ 4,638 36
Service Connections, Horse Expense Account—		
Oats, hay, etc	$ 709 06	
Shoeing	93 50	
Bedding	37 23	
Barn tools	2 50	
Doctors' services and drugs	15 20	
		$ 857 49
Repairing Leaks, Horse Expense Account—		
Oats, hay, etc	$ 708 75	
Shoeing	93 50	
Bedding	33 99	
Barn tools	1 50	
Doctors' services and drugs	13 06	
Horse purchase	160 00	
		$ 1,010 80
		$127,204 14

FOR CONSTRUCTION.

Iron Pipe Construction Account—		
Superintendent and clerks	$ 7,690 14	
Foremen	3,710 13	
Watchmen, teamsters, plumbers, bricklayers and barnmen	11,868 94	
Labor	63,153 63	
Iron pipe	38,227 59	
Special castings	7,939 98	

Gates, valves and hydrants	$ 7,478 63	
Gate well covers	158 32	
Pig lead	2,077 32	
Lead pipe, sheet lead, tin and solder	121 36	
Cement, stone, brick, lime, sand and sewer crock	3,012 61	
Lumber	893 32	
Coal and coke	511 79	
Oil and gasoline	230 65	
Tools	413 77	
Repairing tools	145 82	
Cartage	1,047 95	
Rope, packing and waste	485 05	
Iron, hardware, nails, globes, etc	838 78	
Car fare	220 00	
Paint, lead and oil	176 60	
Printing and stationery	276 12	
Telephone	305 44	
Channel iron, rails and beams	441 57	
Wood plugs and rollers	79 79	
Rubber boots and repairs	159 39	
Telegrams and freight	6 89	
Hose and couplings	142 58	
Pavement and inspector, Board of Public Works	2,150 78	
Bonus refund	256 00	
Derrick pump and repairs	374 33	
Electric lamps, etc	20 52	
Court fees	4 00	
Miscellaneous	286 20	
		$154,905 99

Meter Account—

Superintendent and labor	$ 5,265 54
Meters	4,316 72
Lumber	162 38
Horse board	180 00
Horse shoeing	47 00
Specials and fittings	317 47
Lead, solder, etc	16 79
Telephone	54 00
Packing and rags	12 13
Tools	12 65
Nails, hardware, etc	22 57
Gasoline and oil	5 82
Printing and stationery	16 10
Freight and express charges	3 37

Horse supplies and harness repairs	$ 11 00	
Bicycle repairs	3 00	
Paint, etc.	63	
Miscellaneous	8 07	
		$ 10,455 24
Engineering Account—		
Civil engineer and assistants	$ 12,217 25	
Instruments	59 12	
Tracing cloth and paper	74 58	
Books, maps and stationery	118 81	
Street car tickets	150 00	
Stamps	19 00	
Freight and express charges	5 07	
Paint, oil, etc	1 25	
Telephone	96 06	
Fittings and gauges	33 50	
Lumber	5 30	
Subscription	10 00	
Furniture	30 00	
Rubber boots	11 07	
Miscellaneous	24 47	
		$ 12,855 48
Pumping Works Account—		
Superintendent, foremen and labor	$ 31,083 76	
Inspectors' salary	636 00	
Gates	951 15	
Allis-Chalmers engine contract	144,125 00	
Building contract	10,000 00	
Spier & Rohns contract	300 00	
Special castings	6,645 41	
Cement, sand, crock and stone	6,157 31	
Brick	4,936 07	
Car tickets	100 00	
Lumber	6,082 32	
Iron rails and beams	126 79	
Bedding and horse shoeing	53 50	
Bolts, nuts, nails and fittings	610 81	
Rope, packing, hose, etc	223 09	
Cartage	984 71	
Electric light fixtures	125 68	
Coal	22 74	
Venturi meter, 42 in	1,955 00	
Dump cars and rails	951 81	
Hoisting engine and fittings	697 44	
Dredging, steam pump and repairs	1,981 35	
Telephone rental	117 42	

Tools and repairs	$,369 68	
Paint, oil and glass	152 89	
Painting walls and stone floor contract, and repairs to foundation	2,182 96	
Gasoline engine, fittings and repairs	606 74	
Roof repairs	60 29	
Ice	11 50	
Oil	115 42	
Radiators	421 55	
Freight and express charges	2 18	
Intake repairs and repairs to intake mains	457 46	
Miscellaneous	278 23	
		$223,526 26
Iron Pipe, Horse Expense Account—		
Oats, hay, etc	$ 1,431 46	
Shoeing	204 75	
Bedding	69 22	
Barn tools	11 30	
Doctors' services and drugs	23 17	
Purchase of horses	275 00	
Pasturage	6 00	
		$ 2,020 90
Woodmere Account—		
Pay rolls	$ 23,911 26	
Iron pipe	40,694 14	
Special castings	1,268 87	
Pig lead, tin and solder	5 14	
Brick	497 50	
Hydrants	3,111 95	
Gates	815 52	
Cement and sand	288 92	
Teaming	1,851 26	
Two 6-inch meters and fittings	738 13	
Telegrams	25	
Lumber	30 57	
Rope and packing	5 32	
Rent	45 00	
Miscellaneous	20 60	
		$ 73,284 43
Hamtramck Account—		
Pay rolls	$ 16,329 99	
Iron pipe	15,968 81	
Special castings	771 39	
Gates	1,365 00	
Hydrants	3,898 50	

Sand, stone, brick and cement	$ 379 29	
Car tickets	5 00	
Two 6-inch meters and fittings	721 45	
Tools	23 50	
Car service	1 00	
Cartage	1,100 19	
Coal	160 75	
Lumber	18 09	
Nails and fittings	7 77	
Barn rental	55 00	
		$ 40,805 73

Hurlbut Fund Account—

Library pay rolls	$ 1,372 50	
Labor pay rolls	3,704 40	
Library furniture and repairs	66 37	
Towel supply	5 50	
Seed and pots	52 81	
Memorial Gate repairs, closets, etc	37 71	
Lumber	37 02	
Tools, hardware, etc	42 84	
Pipe and fittings	101 15	
Car fare	1 00	
Express charges	1 47	
Paint, oil, etc	16 09	
Stove	52 00	
Wagon repairs	36 90	
		$ 5,527 76

Interest Account—

Coupons	$ 59,784 78	
Printing and advertising	125 13	
		$ 59,909 91

Bonded Indebtedness—

Bonds redeemed	$ 56,000 00	
		$ 56,000 00

RECAPITULATION OF EXPENDITURES FOR OPERATION, MAINTENANCE AND CONSTRUCTION.

For Operation and Maintenance—		
Office account	$ 28,618 71	
Inspection	7,271 67	
Plumber's license	18 00	
Percentage	6,553 90	
Pumping water	53,259 14	
Repairing leaks	.4,196 76	
Meter repairs and expense	1,583 80	
Service connections	14,970 59	
Office furniture and fixtures	36 59	
Horse, wagon and harness	738 45	
Real estate, revenue and expense	3,423 40	
Water rates	26 48	
Pumping works (grounds only)	4,638 36	
Service connections, horse expense	857 49	
Repairing leaks, horse expense	1,010 80	
		$127,204 14
For Construction—		
Iron pipe extension account	$154,905 99	
Meter account	10,455 24	
Engineering account	12,855 48	
Pumping works account	223,526 26	
Iron pipe, horse expense account	2,020 90	
Woodmere account	73,284 43	
Hamtramck account	40,805 73	
		$517,854 03

GENERAL RECAPITULATION OF EXPENDITURES.

Total operation and maintenance	$127,204 14
Total construction	517,854 03
Total Hurlbut Fund	5,527 76
Total interest account	59,909 91
Total bonded indebtedness	56,000 00
Total expenditures	$766,495 84

The total receipts of the Receiving Clerk from July 1, 1902, to July 1, 1903, were as follows:

1902.		
July	$101,353 34	
August	73,145 62	
September	17,397 21	
October	81,033 13	
November	13,341 13	
December	19,985 50	
1903.		
January	139,938 90	
February	10,426 40	
March	13,811 23	
April	99,854 10	
May	16,811 97	
June	20,479 30	
Total receipts	$607,577 83	
Cash on hand June 30, 1902	3,547 06	
		$611,124 89

With bank deposits as follows:

1902.		
July	$ 99,936 83	
August	76,988 31	
September	14,490 79	
October	80,074 83	
November	17,279 73	
December	18,214 75	
1903.		
January	137,978 01	
February	14,125 68	
March	11,373 76	
April	98,517 96	
May	20,532 36	
June	18,830 69	
Total deposits	$608,343 70	
Cash on hand June 30, 1903	2,781 19	
		$611,124 89

Cash Statement for the Year Ending June 30, 1903.

		Dr.	
Cash on hand June 30th, 1902		$ 3,547 06	
Cash in Bank—			
General Fund account	$143,975 14		
Outstanding checks	54 34		
		143,920 80	
Sinking Fund account		101,844 78	
Hurlbut Fund account		1,928 95	
Secretary Fund account		1,000 00	
		$252,241 59	
Total receipts		607,577 83	
			$859,819 42
		Cr.	
Cash on hand June 30th, 1903		$ 2,781 19	
Cash in Bank—			
General Fund		21,717 06	
Sinking Fund		67,379 09	
Hurlbut Fund		446 24	
Secretary Fund		1,000 00	
		$ 93,323 58	
Total disbursements		766,495 84	
			$859,819 42

THE AMERICAN EXCHANGE NATIONAL BANK.

Detroit, Mich., July 1, 1903.

Benj. F. Guiney, Secretary of Board of Water Commissioners of the City of Detroit, Mich.:

Dear Sir—This is to certify that the amounts of balances in this bank to the credit of the Board of Water Commissioners of the City of Detroit, at the close of business June 30, 1903, were as follows: General Account, $21,717.06; Sinking Fund, $67,379.09; Hurlbut Fund, $446.24; Secretary Fund, $1,000.00.

Yours truly,

HAMILTON DEY,
Cashier.

ASSESSMENT 1903-1904.

Dist.	WARDS.	Families.			Increase.	Vacant Tenements.	Assessment.		
		Supplied.	Not Supplied.	Whole Number.			1903-1904.	Increase.	Transf'rd to Meter Rolls.
1	Ninth.......	6,127	8	6,135	115	169	$18,742 50	$141 45	$332 80
	Fifteenth...	2,290	1	2,291	127	17	10,218 35	737 20	65 50
	Seventeenth	2,788	9	2,797	269	30	13,767 35	2,077 20	131 80
	Totals ...	11,205	18	11,223	511	216	42,728 20	2,955 85	530 10
2	Eleventh ...	4,248	8	4,256	82	6	14,431 45	253 45	218 20
	Thirteenth..	3,761	1	3,762	189	4	13,849 70	1,327 40	88 90
	Totals ...	8,009	9	8,018	271	10	28,281 15	1,580 85	307 10
3	First........	3,446	....	3,446	51	49	19,375 30	805 50	144 90
	Seventh	3,730	5	3,735	27	36	12,188 60	434 00	234 60
	Totals....	7,176	5	7,181	78	85	31,563 90	1,239 50	379 50
4	Third.......	4,070	6	4,076	117	21	14,734 50	664 90	178 00
	Fifth........	4,543	2	4,545	202	30	15,361 40	936 90	93 80
	Totals ...	8,613	8	8,621	319	51	30,095 90	1,601 80	271 80
5	Second	2,595	1	2,596	37	42	16,786 20	313 80	234 80
	Sixth........	4,278	1	4,279	68	35	16,910 20	449 00	61 60
	Totals ...	6,873	2	6,875	105	77	33,696 40	762 80	296 40
6	Tenth.......	5,027	5	5,032	218	15	20,089 05	917 85	164 80
	Fourteenth.	3,300	8	3,308	250	2	13,022 60	840 45	109 10
	Totals ...	8,327	13	8,340	468	17	33,111 65	1,758 30	273 90
7	Fourth......	3,756	6	3,762	70	32	17,638 10	227 50	112 80
	Twelfth	4 002	6	4,008	98	25	15,336 30	376 70	115 80
	Totals ...	7,758	12	7,770	168	57	32,974 40	604 20	228 60
8	Eighth......	4,277	2	4,279	130	17	17,807 10	541 30	97 50
	Sixteenth...	5,042	30	5,072	505	11	17,879 60	1,924 20	159 70
	Totals ...	9,319	32	9,351	635	28	35,686 70	2,465 50	257 20
	Aggregate	67,280	99	67,379	2,555	541	$268,138 30	$12,968 80	$2,544 60

As shown in this table, July 1, 1903, there were 67,379 families supplied with water. Using the average per family obtained as in previous years, 5.04, the population of the city at that time was $339,590, an increase over July 1, 1902, of 13,312.

The average used was obtained by taking the population as shown by the United States Census of 1860-70-80-90, and 1900, and dividing by the number of families on Assessors' books for those years, as follows:

Years.	Population per census.	No. of families assessed.	Average.
1860............	45,619	8,973	5.08
1870............	79,757	14,717	5.42
1880............	116,340	22,423	5.18
1890............	205,876	42,059	4.80
1900............	285,704	60,524	4.72

Making the general average 5.04.

The following table shows the receipts for water rates during the year, arranged by districts, and giving the amount collected upon each annual assessment:

RECEIPTS OF WATER RATES BY DISTRICTS,

From July 1st, 1902, to June 30th, 1903.

YEARS.	1st District Wards 9, 15 and 17.	2d District. Wards 11 and 13.	3d District, Wards 1 and 7.	4th District, Wards 3 and 5.	5th District, Wards 2 and 6.	6th District, Wards 10 and 14.	7th District, Wards 4 and 12.	8th District, Wards 8 and 16.	Meters.	Total.
1893-94			$12 50	$8 25						$20 75
1894-95				3 75						3 75
1895-96				1 25						1 25
1897-98			1 50							1 50
1898-99			2 25		$2 00	$1 50	$1 50	$3 00		10 25
1899-00			8 57					3 00		11 57
1900-01	$5 85	$1 00	12 25	8 22	11 45	2 70		58		42 05
1901-02	873 30	459 98	832 84	655 17	1,070 90	742 42	936 93	953 12		6,524 16
1902-03	40,203 15	26,678 98	30,222 28	28,580 87	32,251 24	31,808 78	32,107 70	33,646 13	$136,176 40	391,675 53
Total..	$41,082 30	$27,139 96	$31,091 69	$29,257 51	$33,335 59	$32,555 40	$33,046 13	$34,605 83	$136,176 40	$398,290 81

The amount expended for the Pumping Works to July 1st, 1903, is as follows:

ITEMS.	Previously Expended.	July, 1903.	Total.
Land	$38,331 44		$38,331 44
Force Mains	624,058 03		624,058 03
Inlet Pipe	101,971 19	$457 46	102,428 65
Dock, Basins and Canal	152,923 86		152,923 86
Conduits and Wells	192,335 26	55,998 28	248,333 54
Engine, Boiler and Coal Houses	296,484 13	15,098 72	311,582 85
Stand Pipe and Tower	31,674 25		31,674 25
Pump Wells	54,221 56		54,221 56
Engines	366,603 87	144,125 00	510,728 87
Boilers	96,551 27		96,551 27
Engineer's House	8,139 75		8,139 75
Sewers	6,666 25		6,666 25
Electric Light Plant	2,781 19	125 68	2,906 87
Inspection	4,786 54	636 00	5,422 54
New Gallery	8,249 10		8,249 10
Traveling Crane	2,390 00		2,390 00
Grounds, Fences and Gateway	163,778 07	4,731 26	168,509 33
Library, Greenhouse and Belvedere	34,701 48	239 43	34,940 91
Miscellaneous	18,461 59	2,114 43	20,576 02
Totals	$2,205,108 83	$223,526 26	$2,428,635 09

Water Works Bonds.

The following table shows the whole history of the bonded indebtedness of the Board, in which it will be seen that the total amount of bonds issued is $2,200,000, of which $1,177,000 have been redeemed or refunded, leaving outstanding $1,023,000.

The $100,000.00 seven per cent. bonds which matured September, 1899, and $100,000.00 seven per cent. bonds which matured February 1st, 1900, were on the latter date refunded at three and one-half per cent.

No. of Issue.	Act of	Issued.	Payable.	Amount.	Rate of Interest.	Redeemed or Refunded	Outstanding.
1st	1853	Aug. 1, 1853	Aug. 1, 1883	$100,000	7cts.	$100,000	....
"	"	" "	Aug. 1, 1878	100,000	7 "	100,000	....
"	"	" "	Aug. 1, 1873	50,000	7 "	50,000	....
2nd	1855	Aug. 1, 1855	Aug. 1, 1890	100,000	7 "	100,000	....
"	"	June 12, 1855	Aug. 1, 1885	100,000	7 "	100,000	....
"	"	" "	Aug. 1, 1880	50,000	7 "	50,000	....
3rd	1857	Aug. 1, 1858	Aug. 1, 1893	150,000	7 "	150,000	....
"	"	Aug. 1, 1867	Aug. 1, 1887	100,000	7 "	100,000	....
* 4th	1869	Feb. 1, 1870	Feb. 1, 1900	100,000	7 "	100,000	....
5th	"	Aug. 1, 1872	Aug. 1, 1902	50,000	7 "	50,000	....
6th	"	Aug. 1, 1873	Aug. 1, 1903	50,000	7 "	....	50,000
"	1873	Feb. 1, 1874	Feb. 1, 1904	50,000	7 "	9,000	41,000
7th	1869	Aug. 1, 1874	Aug. 1, 1904	50,000	7 "	6,000	44,000
"	1873	" "	" "	200,000	7 "	3,000	197,000
"	"	June 1, 1875	June 1, 1905	150,000	7 "	2,000	148,000
"	"	June 1, 1876	June 1, 1906	200,000	6 "	7,000	193,000
* "	"	Sept. 1, 1880	Sept. 1, 1899	100,000	4 "	100,000	....
"	"	April 1, 1881	April 1, 1897	100,000	4 "	100,000	....
"	"	Dec. 1, 1881	Dec. 1, 1896	50,000	4 "	50,000	....
"	"	Jan. 10, 1895	Jan. 10, 1925	100,000	4 "	....	100,000
*Refund	1869 1873	Feb. 1, 1900	Feb. 1, 1930	200,000	3½"	....	200,000
	1873	Jan. 1, 1903	Jan. 1, 1933	50,000	3½"	....	50,000
				$2,200,000		$1,177,000	$1,023,000

Estimated Valuation of Works.

Real estate	$ 441,671 75
Buildings, docks, basins, conduits, engines, etc., at pumping station	2,162,872 34
Water pipe in use	4,263,078 11
Meters in use	100,948 47
Office furniture and fixtures	8,267 14
Tools and materials on hand:	
In office of Civil Engineer	23,510 75
In office of Supt. of Construction	280 00
In Inspection Department	101 50
In Meter Department	2,659 23
In Pumping Works Department	11,908 58
In Hurlbut Fund Department	2,048 12
At storage yards	59,600 85
Total	$7,076,946 84

All of which is respectfully submitted.

BENJ. F. GUINEY,
Secretary.

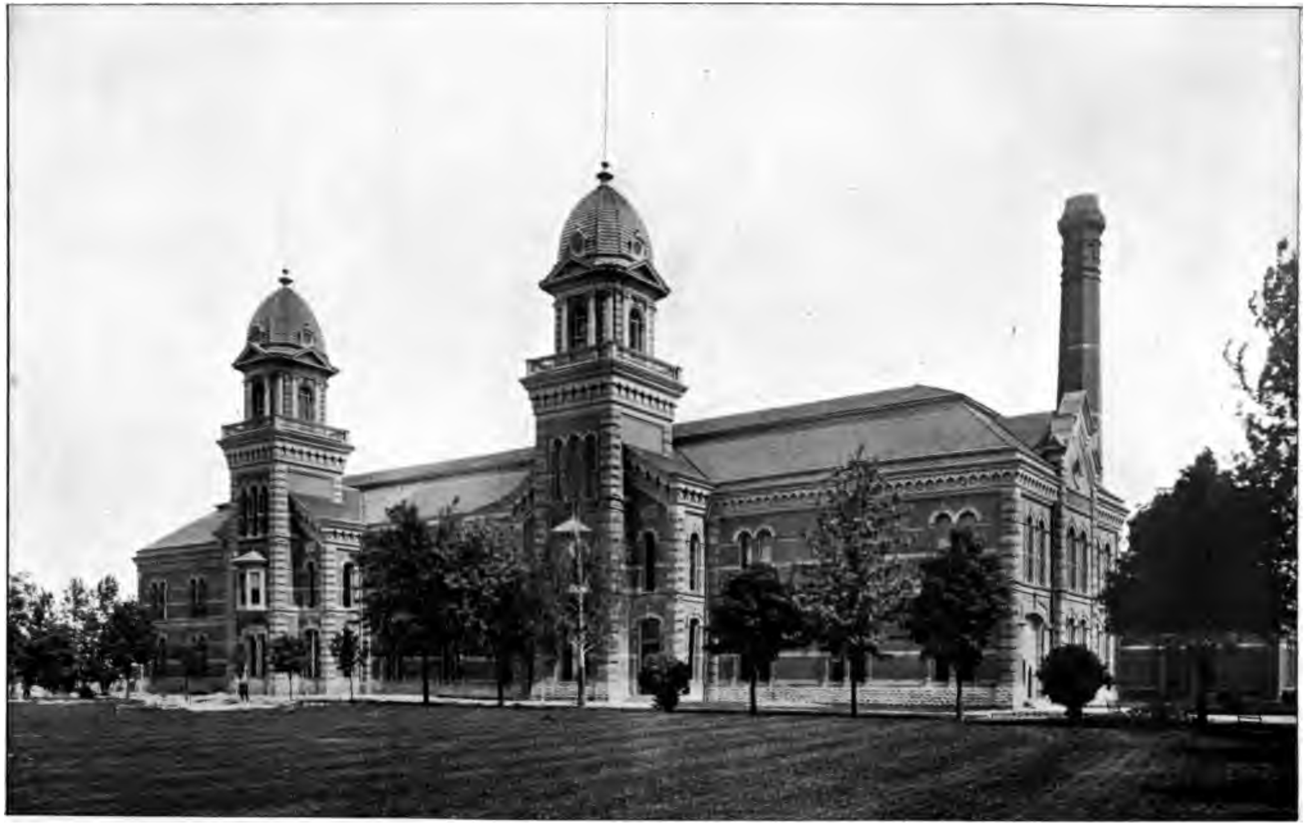
Detroit, Mich., Sept. 30, 1903.

To the Board of Water Commissioners of the City of Detroit:

Gentlemen—I have examined the books and vouchers of the Board of Water Commissioners, and the foregoing report of the Secretary, for the year ending June 30, 1903, and find the same to be correct.

Respectfully submitted,

J. A. DRESSER,
Accountant.



REPORT OF THE GENERAL MANAGER.

Detroit, July 1, 1903.

To the Board of Water Commissioners of the City of Detroit:

Gentlemen—I respectfully submit a report of the general operations of the works for the year ending June 30th, 1903.

The assessment rolls of water rates show a gain for the year over the previous year of $12,968.80. There was no change in the schedule of rates.

The increase of families for the same period was 2,555. The details as to number of families assessed in each ward and district, vacant tenements, number of families not supplied, and increase of assessments, will be found by reference to the table of assessments in the report of the Secretary.

The total number of gallons of water pumped during the year was 18,757,682,360, of which 159,902,204 gallons was supplied to the Village of Delray; 22,556,688 gallons to the Village of River Rouge; 17,135,932 gallons to the Village of Highland Park; 14,606,196 gallons to the Village of Hamtramck, and 12,775,092 gallons to the Village of Woodmere.

The city receives double the city rate for all water supplied these villages.

The average daily consumption of water was 51,390,911 gallons. The highest day's consumption was 75,577,320 gallons, on Wednesday, February 18, 1903, and the lowest was 38,859,730 gallons on Sunday, April 12, 1903.

The amount received for metered water was the sum of $136,176.40, of which amount the Village of Delray paid

$7,203.46; the Village of River Rouge, $1,023.62; the Village of Highland Park, $779.76; the Village of Hamtranck, $661.58, and the Village of Woodmere, $581.32.

Storage Grounds.

Many needed improvements have been perfected at the Storage Grounds during the year. The blacksmith and carpenter shops have been completed and a brick shelter, for the protection of the flushing and emergency wagon, erected. A 10-ton wagon scale has been built. To secure watchfulness and prompt response in case of emergency the Still Alarm system has been adopted at both the main office and the yards, and call bells and private telephones, connecting the houses of the men living on the grounds with the office of the Superintendent of grounds, have been established, and an emergency wagon, fully equipped with all necessary tools, etc., has been provided. The pipe yard has been removed from the west to the east yard, and the pipe platform in the west yard, which had become dangerous from decay, removed. The ground it occupied has been graded and sown with grass seed, much improving its appearance. The house of the Superintendent has been repainted and the houses of the men on the grounds have been put in good repair. A new fence has been built in front of these houses and a concrete walk constructed along the entire front of the grounds on Erskine street.

Pumping Works.

The new 42-inch main, with necessary connections, wells and gates, has been completed. A large amount of grading, sodding and additions to the drainage system has been necessary, and the park presents a most attractive appearance. Iron fences have been placed at each end of the west bank of the receiving basin for protection from foot travelers. An iron fence has been placed at north end of dock and a wooden rail fence along the east side, for protection from vehicles and the safety of visitors. The dock will need extensive repairs in the near future. The 10-foot intake tunnel has been completed to the shore, with the exception of about 125 feet, and shore shaft built. Considerable necessary repairs were made to old seven-foot tunnel on east line of grounds. Concrete docks have been built at all intakes in receiving basin with the exception of two at the south bank, which will be built as soon as conditions will permit. Extensive repairs have been made to library building, greenhouse and lavatories.

One of the new 25,000,000 triple expansion engines is ready for trial, and the second one is nearing completion. The addition to the engine house is ready for acceptance. A new stone flag flooring has been laid in the old portion. Concrete floors have been laid in the coal sheds, replacing the plank flooring, which was much decayed. The interior of the boiler rooms has been repainted and a wash room, with lockers, shower bath and wash tank, provided for the firemen, the old carpenter shop being altered for the purpose. The coal scales have been more conveniently located, and tracks for coal cars relaid to be flush with boiler room floor.

The use of the Hurlbut Memorial Library, operated as a branch of the Public Library, has increased over the previous year. The number of reference books used in the library was as follows: July, 1902, 278; August, 325; September, 335; October, 500; November, 745; December, 512; January, 1903, 174; February, 254; March, 395; April, 345; May, 179; June, 162.

Public Library books were circulated as follows: July, 1902, 460; August, 425; September, 398; October, 525; November, 535; December, 569; January, 1903, 170; February, 245; March, 395; April, 550; May, 680; June, 553.

The following table shows amount of water pumped each year from 1852 to 1903:

YEARS.	FAMILIES SUPPLIED.	WATER PUMPED.	
		TOTAL QUANTITY.	PER FAMILY.
1852	......	235,840,275	......
1853	4,283	303,531,743	70,868
1854	4,619	376,265,126	81,460
1855	5,282	542,807,364	102,765
1856	5,706	692.124,305	121,297
1857	6,189	697.190,523	112,650
1858	6,474	718,091,207	110,919
1859	6,794	782,112,587	115,118
1860	6.750	870,036,451	125,185
1861	7,128	895,129,423	125,579
1862	7,275	994,945,329	136,762
1863	7,699	1,035,798,043	134,534
1864	7,993	1,019,390,256	127,410
1865	8,351	1,040.514,887	125,675
1866	9,089	1,196,317,922	131,622
1867	10,242	1,425,535,230	139,186
1868	11,544	1,666,545,125	144,364
1869	12,774	1,946,810,325	152,400
1870	13,722	1,866,060,068	136,000
1871	14,896	2,300,150,605	154,414
1872	16,035	2,782,292,578	173,513
1873	17,019	3,198,393,948	187,930
1874	18,853	3,289,872,635	174,511
1875	19,606	4,207,454,260	214,600
1876	20,102	4,065,134,470	200,225
1877	20,345	4,213,239,790	207,090
1878	20,603	4,345,743 330	210,927
1879	21,341	5.129,599,110	240,348
1880	22,465	5,552,965,310	247,183
1881	23,749	6,543,127,968	279.722
1882	25,442	6,284,000,742	243,062
1883	27,415	7.379,327,788	269,170
1884	29,424	8,510,614,140	289,260
1885	30,533	9,970,829,580	326,886
1886	31,946	10,576,571.254	331,070
1887	34,486	13,168,859,808	381,860
1888	36,863	14,380,166,670	390,098
1889	39,158	12,875,334,453	328,880
1890	41,467	12,120,944,532	292,300
1891	43,933	12,057,261,236	274,470
1892	46,400	12,276,612,482	264,582
1893	49.817	13.877.977,208	278,579
1894	49,912	13,649,779,605	273,476
1895	51,426	14,698,451,954	285,818
1896	53,941	13,254,369.371	245,719
1897	54,945	12,928,821,326	235.305
1898	56,341	14,278,682,058	253,433
1899	58,931	16,348,062,701	277,410
1900	60,524	17,077,100,477	282,154
July, 1901 to July, 1902	64,718	18,333,104,706	283,320
July, 1902 to July, 1903	67,280	18,757,682,360	* 275,440

---

*226,976,112 gallons delivered outside Detroit; deducted from total pumped.

Pipeage System.

You are respectfully referred to the report of the Superintendent of Construction for details of the work done in this department during the year.

The entire system has been thoroughly flushed during this period and dead ends regularly blown off. All gates have been systematically examined and repairs made where necessary.

To be prepared for an emergency, in case of a break in one of the large supply mains, I have provided for a gate key to be permanently kept in wells of large gates, where keys out of the ordinary must be used. The value of every minute in handling gates on large mains in case of break is apparent, and I believe this provision will result in a saving of time.

No serious break in the system occurred during the year.

The total mileage of the distribution system, July 1, 1903, was 617 miles and 1,300 feet. Thirty-five miles and 3,608 feet were laid during the year, of which 28 miles and 3,687 feet were laid in the villages of Delray, Woodmere, River Rouge and Hamtramck, the said villages paying the entire cost thereof.

Data Detroit Water Works, July 1, 1902, to July 1, 1903.

System of water works: Direct pressure. No reservoir.

Source of supply: Detroit River.

Number of pumping stations: One.

Type of pumps: One 30,000,000 Comp. Beam; two 24,000,000 Comp. Beam; one 24,000,000 triple Allis. Total daily capacity, 102,000,000.

Area of city: 29 square miles.

Population: (See Secretary's report), 339,590.

Pumpage: 18,757,682,360.

Consumption, gallons, unmetered: 13,784,163,788.

Consumption, gallons, metered: 4,973,518,572.

Average daily consumption: 51,390,911.

Consumption, per capita (city): 150 gallons.

Revenue, unmetered water: $262,113.60.

Revenue, metered water: $136,176.40.

Revenue, per 1,000 gallons metered water: .0265.

Revenue, per 1,000 gallons unmetered water: .019.

Number of meters: 5,847.

Kind of coal used: Bituminous, run of mine.

Price, per ton: $2.36¼ in sheds.

Total cost of fuel consumed (including heat and light of library and greenhouse), $26,909.99.

Average head against pumps in feet: 115.

Number of miles mains: 617.

Number of fire hydrants: 3,834.

Fire cisterns: 558. Capacity, 4,830,000 gallons.

Service taps: 61,465.

Gates: 7,382.

City Water Supply.

The following is the report of the Board of Health of the analysis of the water supply for the month of June, 1903:

Appearance—Nearly clear.

Total solids	116.4
Volatile matter	40.2
Non-volatile matter	76.2
Free ammonia	.008
Albuminoid ammonia	.088
Nitrogen as nitrates	.099
Nitrogen as nitrites	.000
Chlorine	2.75
Oxygen absorbed in 15 minutes	.36
Oxygen absorbed in 4 hours	.80
Bacteria per cubic centimeter:	
June 12, '03	.98
June 13, '03	.75
June 15, '03	.178
June 16, '03	.125

Growth in .2 per cent. carbo-gelatine—None.
Colon bacilli not found.
Conclusion: Water is in good condition.

Respectfully submitted,
W. I. TIBBALS,
Chemist and Bacteriologist.

All of which is respectfully submitted.

H. S. STARKEY,
General Manager.

REPORT OF THE CIVIL ENGINEER.

Detroit, Mich., July 31, 1903.

To the Board of Water Commissioners of the City of Detroit:

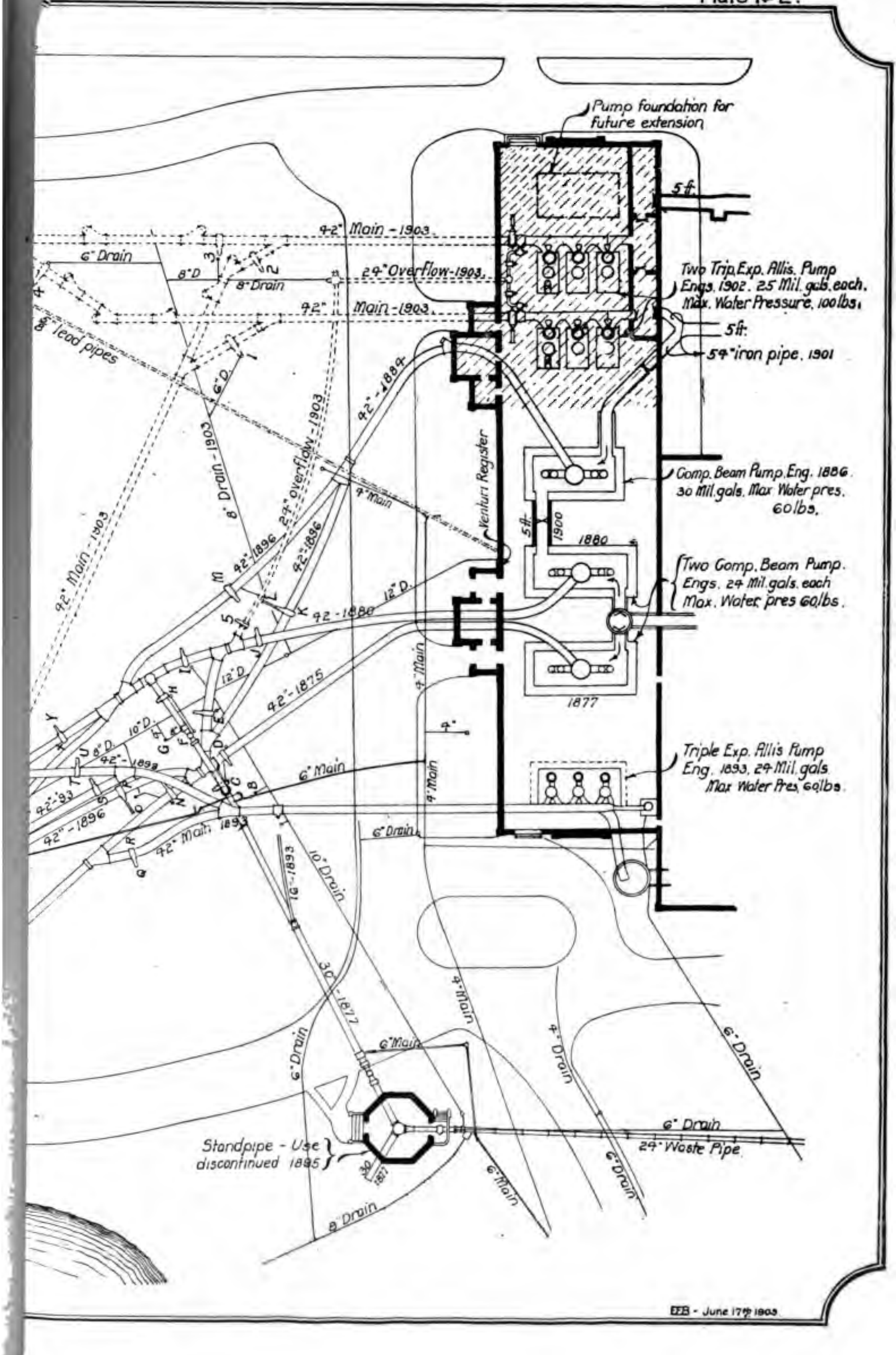
I have the honor to present the report of the Civil Engineer for the year ending June 30, 1903.

Distribution.

At the close of the year the distribution system comprises 617.25 miles of cast iron mains controlled by 7,382 shut-off valves, and supplying 63,342 service connections. The net increase in length of mains is 35.68 miles, of which 28.70 miles, or about 80 per cent., is outside the city limits, principally in the villages of Woodmere and Hamtramck. These villages are at present supplied through two six-inch Thomson meters each, connections being made for four when required.

The Hamtramck meters are located, one at Chene and Whiting, and one at St. Aubin and Clay. The latter is temporarily shut off to prevent backward registration on account of the Acme White Lead Works connection, which has not yet been transferred from the city to the village mains. About 7½ miles of pipe will be required to complete the Hamtramck system. The meters supplying Woodmere are set in a brick well located near the city line at the intersection of Artillery and Army. A similar well was also built at Artillery and South, and on September 20 the two 6-in. Thomson meters supplying the village of Delray were removed from the

Plate № 2.


Pump foundation for future extension
5 ft.
42" Main - 1903
6" Drain
8" D
8" Drain
24" Overflow - 1903
42" Main - 1903
Two Trip. Exp. Allis. Pump Engs. 1902. 25 Mil. gals. each. Max. Water Pressure, 100 lbs.
5 ft.
54" iron pipe, 1901
8" lead pipes
6" D.
42" - 1884
8" Drain - 1903
24" Overflow - 1903
4" Main
Venturi Register
Comp. Beam Pump. Eng. 1886. 30 Mil. gals. Max. Water pres. 60 lbs.
5 ft.
1900
1880
Two Comp. Beam Pump. Engs. 24 Mil. gals. each. Max. Water pres 60 lbs.
42" Main - 1903
42" 1896
42" 1896
12" D.
42 - 1880
12" D
42" - 1875
1877
4" Main
4"
10" D.
8" D.
42" - 1893
42" - 93
42" - 1896
6" Main
42" Main 1893
Triple Exp. Allis Pump Eng. 1893, 24 Mil. gals. Max Water Pres. 60 lbs.
6" Drain
4" Main
16" - 1893
10" Drain
30" - 1877
4" Main
6" Drain
6" Main
4" Drain
6" Drain
6" Drain
24" Waste Pipe
Standpipe - Use discontinued 1885
30" 1877
6" Main
6" Drain
8" Drain
EEB - June 17th 1903

Solvay Process Co.'s works and reset in the new well at the city line, one additional meter being placed at the same time. The arrangement of the Delray and Woodmere meters is shown on Plate No. 1.

Although the mileage is small, the most important additions to the system have been made within the city limits. The line of 12 and 10-inch pipe laid from the 42-inch main in Congress through Elmwood, Jefferson and Adair, greatly improves the fire service in those streets, and especially protects the Michigan Stove Works' plant. The line of 36-inch pipe laid in Superior street from Mt. Elliott to the 42-inch in Collins, completes the high service main supplying the upper district of the city. The line of 36-inch pipe laid in Mack avenue from Gratiot to Chene, together with the alterations at Chene and Scott, form a connecting link between the Mack avenue 42-inch main laid in 1880 and the line of 42 and 30-inch pipe which supplies the north and western portion of the low service district. To complete this link there yet remains the connection to be made at Mack, Gratiot and Collins. The Mack avenue main will then be used in the high service system in cases of emergency only.

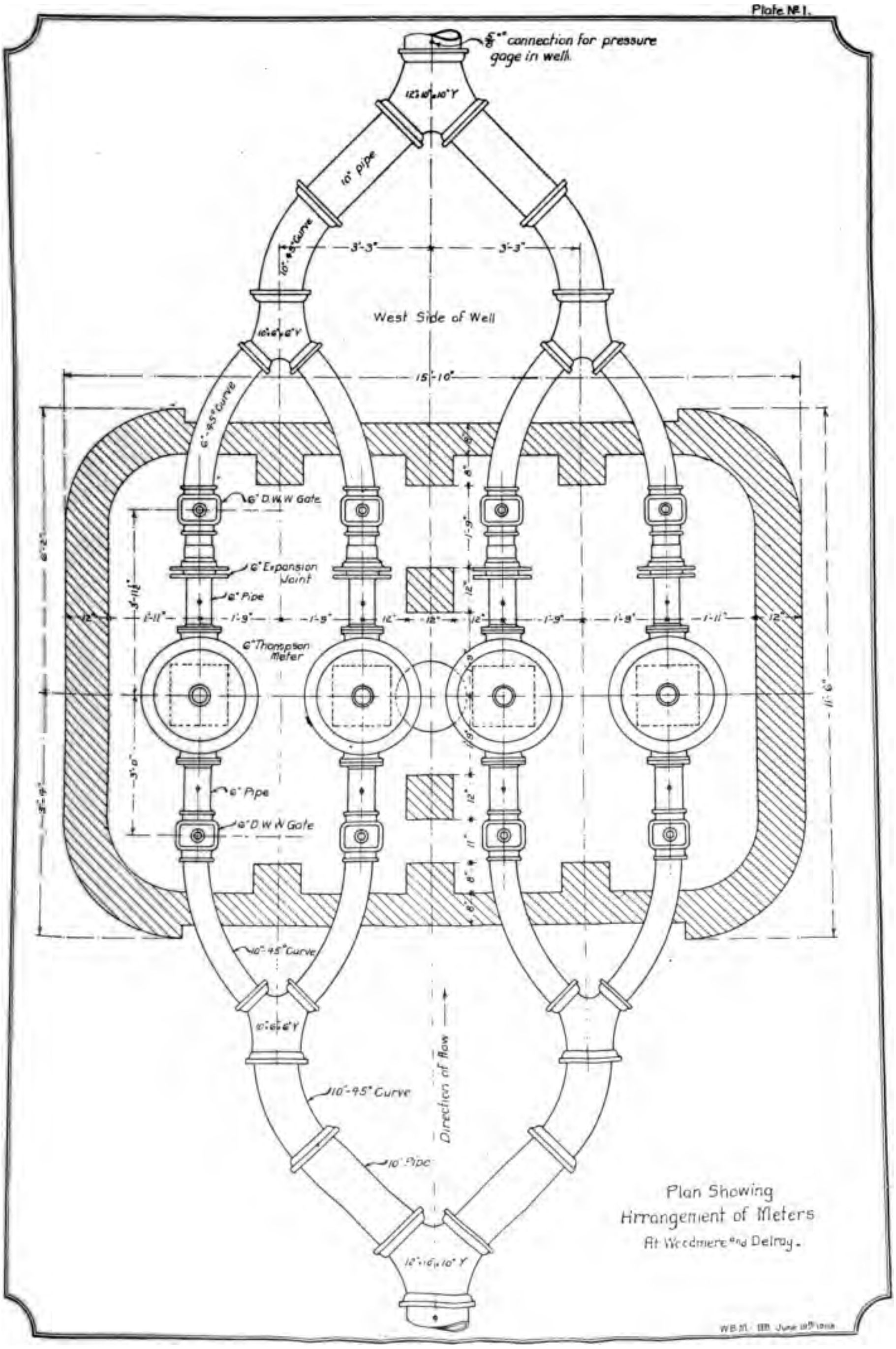
The most difficult work has been at the Pumping Station connecting the two 25,000,000 gallon pumps with the high and low service mains. In this work thirteen 42-inch Ys and five 42-inch gates were used, and connections provided for an additional pumping engine in the future. Two of the Ys failed under a test pressure of 140 lbs. Twelve of them have therefore been strengthened by placing three 2-inch upset steel stay bolts through the body of the special. The work was done at comparatively little expense with the specials in place, and the remaining "Y" will be reinforced in the same manner as soon as conditions will permit. The high service main is provided with a 42-inch Venturi meter, the register being placed within the pumping station.

Plate No. 2 shows the present arrangement of forty-two inch force mains leading from the pumps to distribution system. This arrangement is a growth rather than a design, and its construction has been largely influenced by existing conditions at the time each addition was made, and by the necessity of keeping the plant in continuous operation. Although somewhat complicated, the arrangement is very effective, in that it admits of many combinations between the various pumps and mains. The principal danger is that a serious break might flood the grounds and make it difficult to find or operate the valves.

Electrolysis.

On June 26th, through the courtesy of A. A. Knudson, who was in attendance upon the American Water Works Association, millivolt readings were taken on the high-pressure 42-inch main at the Pumping Station, and although the connections were incomplete, a flow toward the river varying from 10 to 1,400 amperes was found. This large current cannot fail to do harm if long continued, and already there have been several suspicious cases of leaking joints. A special investigation and report upon this subject will be made as soon as the affairs of the Department will permit.

Plate No 1.



Plan Showing
Arrangement of Meters
At Woodmere and Delray.

Consumption.

The following table gives in detail the use of water and the number of actual consumers in the city and villages supplied.

CORPORATION SUPPLIED.	U. S. GALLONS PUMPED July 1, 1902 to June 30, 1903.		Estimated Number of Consumers.	Gallons Daily per Consumer, 1902-3.	Gallons Daily perConsumer Previous Year, 1901-2.
	Total.	Daily Average.			
Detroit, unmetered....†	13,293,332,162	36,420,088	* 317,225	160.0	163.3
Detroit, metered.......‡	5,237,374,076	14,348,970			
Delray, metered........	159,902,204	438,088	4,760	92.0	91.0
River Rouge, metered..	22,556,688	61,799	1,735	36.2	22.7
Woodmere, metered...§	12,775,092	41,612	1,920	21.6	....
Highland Park, metered	17,135,932	46,948	564	83.2	79.3
Hamtramck, metered..¶	14,606,196	104,330	825	126.5	....
Totals............	18,757,682 350	51,461,835	327,029	157.4	161.7

† The number of gallons pumped in all cases estimated from plunger displacement, allowing 1% for slip, which is considered ample for Detroit conditions.

* The number of consumers in the city is estimated at the 1900 U. S. census rate of 4.715 persons per family supplied; the increase in villages at the rate of 5.0 persons per tap set during the year.

‡ This item includes 439,335,616 gallons furnished by meter, free of cost, for public and charitable uses.

§ Water turned on Aug. 28, 1902, last reading July 1, 1903, making 307 days.

¶ Water turned on Jan. 28, 1903, last reading June 17, 1903, making 140 days.

The daily consumption per capita for the city is 3.3 gallons less than for the preceding year. Including villages, 16,402 consumers have been added during the year, an increase of 5.3%, while the total water pumped increased only 424,577,644 gallons, or 2.2%. Considering the city alone, 28.3% of all water used is metered, while only 5,885 out of 61,465, or 14.4%, of taps are metered.

Weather conditions have been generally favorable for low consumption. The maximum and minimum days were Wednesday, February 18, 1903, and Sunday, March 29, 1903, when 75,577,320 and 39,215,580 gallons were pumped respectively, the average daily rate for the year being 51,390,911 gallons.

The maximum hour occurred on Monday, May 18, 1903, between 5 and 6 p. m., when the pump registered 3,475,400 gallons, or at the rate of 83,409,600 gallons per day, which is nearly 6,000,000 gallons less than record rate reached on July 1, 1901.

The minimum hour occurred between 5 and 6 a. m. Sunday, March 15, 1903, when 1,142,800 gallons were pumped, or at the rate of 27,427,200 gallons daily.

On Plate No. 3, the consumption of water, average temperature and total precipitation for each day of the year is graphically shown. The number of gallons pumped is in all cases estimated from the plunger displacement, allowing 1% for slip, which is considered ample for Detroit conditions.

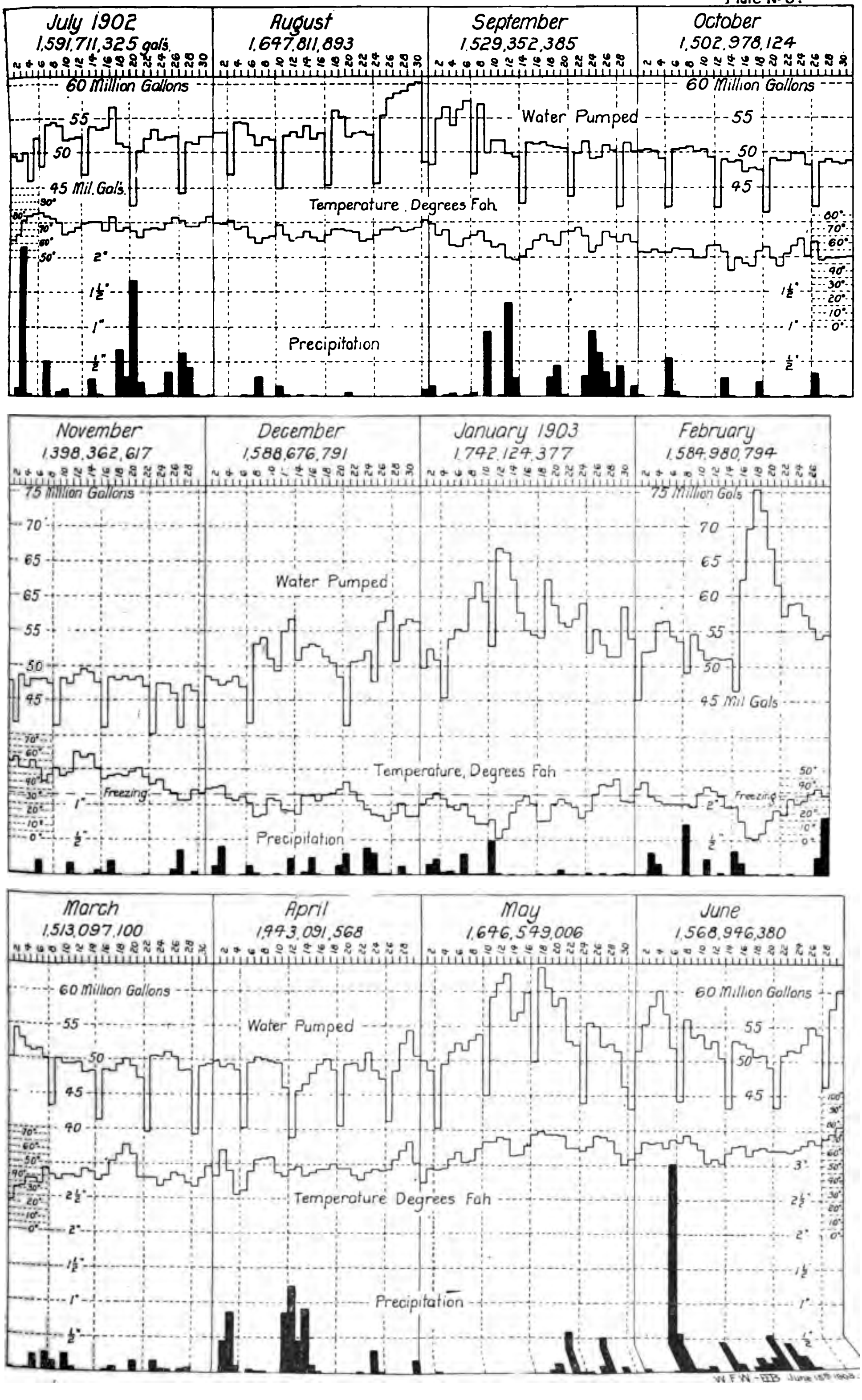
Pressures.

The pressure and frictional loss indicated by an average of the hourly gauge readings taken in the various engine houses is given in detail in table on page 51. In the low service district the lowest pressure recorded was eleven pounds at Alexandrine, near Cass, and at Sixteenth and Grand River, the average pressure at these points being between 17 and 18 pounds. In the high service the pressure varies from 12 to 27, with an average of about 19½ pounds.

Attention is called to the fact that, although maximum conditions were not as severe as in the preceding year, the average frictional loss has increased throughout the city generally on account of the greater daily average consumption.

Daily Water Consumption, Average Temperature and Precipitation, 1902-3.

Plate No 3.



LOCATION OF GAUGES.	Elevation gauges. City datum 0=480.30 sea level.	Elevat'n pounds above surface pump wells 92.00, at which engine gauges are set.	AVERAGE DAILY GALLONS 50,227,684 July 1, 1901, to June 30, 1902.				AVERAGE DAILY GALLONS 51,390,911 July 1, 1902, to June 30, 1903.				INCREASE OR DECREASE IN PRESSURE AND FRICTION DURING LAST YEAR.				MAXIMUM HOUR OBSERVED, May 18, 1903, 3,475,400 gals, 5 to 6 P. M. Daily Rate 83,409,600 gals.		
			PRESSURE, POUNDS.				PRESSURE, POUNDS.				PRESSURE.		FRICTION.				
			High	Low.	8760 Readings Average.	Fric. Loss, Lbs.	High	Low.	8760 Readings Average.	Fric. Loss, Lbs.	Inc.	Dec.	Inc.	Dec.	Average Pressure Lbs.	Fric. Loss.	
Pumping Station	92.00	....	60	41	50 59	....	61	44	51.23	....	.64	....	......	.....	58.83	....	
Eng. No. 26, Crane and Brinkett	125.787	14.62	43	26	34.58	1.39	45	29	35.45	1.16	.87	.....	......	.23	41.00	3.21	Low Service
Eng. No.7, Concord near Jefferson	124.773	14.19	41	28	34.36	2.04	41	29	34.70	2 34	.34	....	.30	.....	37.00	7.64	
Truck No. 6, Elmwood and Fort	124.495	14.07	35	25	30.06	6.46	36	24	30.83	6.33	.77	.....	......	.13	33.00	11.76	
Eng. No 2, Hastings nr. Congress	120 981	12.55	37	24	30.75	7.29	35	25	30.79	7.89	.04	.....	.60	.....	30.00	16.28	
Water Office, Randolph and Jefferson	125.176	14.36	33	22	27.88	8 35	32	22	27.95	8.92	.07	.....	.57	.....	26.00	18.47	
Truck No. 1, Wayne and Larned	116.738	10.71	35	24	31.42	8.46	35	25	31.15	9.37	......	.27	.91	.....	30.50	17.62	
Eng. No. 3, Griswold and Clifford.	123.059	13 44	35	24	29.57	7.58	35	23	29.00	8.79	......	.57	1.21	....	26.50	18.89	
*Eng. No. 8, Sixth and Baker	121.072	12 58	37	24	29.32	8.69	35	25	29.69	8.17	.37	.....	......	.52	....	......	
Eng. No. 4, Eighteenth nr. Howard	116.179	10.46	34	21	27.61	12.52	34	21	27.37	13.40	......	.24	.88	.....	21.00	27.37	
Truck No. 4, Twentieth nr. Rose	124 825	14.21	32	16	24.58	11.80	32	17	24.48	12.54	......	.10	.74	.....	20.50	24.12	
Eng. No. 10, Sixteenth and Bagg.	125.282	14.41	34	19	26.37	9.81	32	20	26.43	10.39	.06	.....	.58	.....	21.00	23.42	
Eng. No. 15, Hubbard near Fort	114.977	9.95	35	15	26.88	13.76	33	17	27.38	13.90	.50	.....	.14	.....	21.50	27.28	
†Eng. No. 27, Junction and Rogers	113.743	9.41	......	......	....	......	37	18	28.10	13.72	......	.....	......	.....	20.00	29.42	
‡Delray, Solvay Process Co. Works.	113.360	8.38	36	18	28.53	13.68	33	17	28.43	13.63	......	.10	......	.05	....	......	
Eng. No. 14, Scotten nr. Michigan.	121.369	12.71	37	16	27.52	10.36	35	19	27.57	10.95	.05	.....	.59	.....	20.00	26.12	
Eng. No. 22, Michigan nr. Hammond	119.444	11.88	35	16	26.46	12.25	35	17	26.60	12.75	.14	.....	.50	.....	17.50	29.45	
Truck No. 10, Sheridan and Mack.	140.254	20.89	35	20	27.46	2.24	36	20	27.77	2.57	.31	.....	.33	.....	31.50	6.44	
§Eng. No. 18, Mt. Elliott nr. Sylvester	147.417	23.99	33	18	25 43	1.67	31	18	24.48	2.76	......	.94	1.09	.....	26 50	8.34	
Eng. No. 11, Grandy and Gratiot	143.211	22.17	28	16	22 04	6.38	28	16	21.73	7.33	......	.31	.95	.....	20.50	16.16	
Eng. No. 6, Russell and High	144.845	22.88	25	14	19 78	7.93	26	14	19.56	8.79	......	.22	.86	.....	18.50	17.45	
Storage Yd. Erskine nr. Riopelle.	150.635	25.38	22	13	17.53	7.68	23	12	17.38	8.47	....	15	.79	.....	16 00	17.45	
Truck No. 5, Russell and Erskine.	147.742	24.13	25	10	18 59	7.87	23	13	18.37	8.73	......	.22	.86	.....	15 00	19.70	
Eng. No. 5, Alexandrine nr. Cass.	146.693	23.68	24	11	18.37	8.54	22	11	17.72	9.83	......				14.00	21.15	
Eng. No. 12, Sixteenth and Grd. River	141.546	21.45	24	10	17.51	11.63	23	11	17.13	12.65	......	.65 .38	1.29 1.02	....	13.00	24 38	
Eng. No. 20, Baldwin and Gratiot.	145.368	23.10	34	16	25.68	1.81	34	18	26.21	1.92	.53	.....	.11	.....	31.00	4.73	
Eng. No. 23, Moran and Boulevard	154.288	26796	28	12	19.69	3.94	27	13	19.81	4.46	.12	.....	.52	.....	21.50	10.37	High Service
Eng No. 13, Russell and Ferry	157.304	28.27	25	11	18.09	4.23	25	13	18.42	4.54	.33	....	.31	.....	18 00	12.56	
Eng. No. 17, Cass and Amsterdam	152.825	26.33	26	11	19.41	4.85	26	12	19.66	5.24	.25	.....	.39	.....	18.50	14.00	
Eng. No. 21, Lincoln nr. Piquette.	154.880	27.22	27	12	20 02	3.35	27	12	20.38	3.63	.36	.....	.28	.....	19.50	12.11	
Eng. No. 24, Mott nr. John R.	155.855	27.64	26	11	18.39	4 56	27	13	19.51	4.08	1.12	.....	......	.46	19.50	11.69	

*** Engine No. 8 Gauge out of service Dec. 2, 1902, until changes are made in house.**
† Engine No. 27 Gauge was put in service Nov. 16, 1902.
‡ Delray Gauge readings discontinued Sept. 16, 1902, account of removal of meters.
§ Engine No. 18 Gauge was reset Sept. 17, 1902. Elevation 1 foot 1¾ inches higher.

Tunnel and Intakes.

The new shore tunnel is 1,032 feet long, measured from a point opposite the center of Junction well No. 3 to the center of the shore shaft. It is 10 feet inside diameter, lined with four rings of common brick laid in Portland cement mortar. There remains to be completed 111 feet of conduit, including a junction well 21 feet in diameter, in which valves will be placed and branches taken off leading to the settling basin.

The shore shaft and 49 feet 1 inch of the river tunnel is completed. The distance from the center of the shore shaft to the center river crib will be 3,160 feet. The greatest depth of water over the tunnel will be 30 feet, at which point there will be 26 feet of clay between the bottom of the river and the top of the tunnel excavation. The bottom of the excavation will be from 30 to 50 feet above lime rock. The river and shore tunnels are of the same size and material, and the elevations of inside top are 36.0 and 79.0 respectively, city datum.

The heading of the river tunnel is in impervious, non-swelling clay of excellent quality. No water has thus far been encountered, and the prospect is favorable for completing the work with entire safety and at a reasonable cost.

The six-foot intake pipe nearest the pier was damaged by a coal boat in the late fall and repaired with a sleeve placed by a diver. The three intakes and intake pipes should all be examined and thoroughly repaired before another winter.

Anchor Ice.

On December 12 ice crystals, forming in the open settling basin, were drawn into the conduits leading to the pumps and lodged against the screens in the five strainer wells, nearly cutting off the water supply. The screens are of boiler plate ⅜-inch thick with 7-16 inch holes punched ¾-inch centers, and are built into solid masonry to prevent foreign or obnoxious substances from damaging the pumps or entering the mains. The total area of the screens is about 1,580, and the net area of openings 422 square feet. The trouble began at 4:30 a. m., when the pumps were drawing 1,684,000 gallons per hour, which would cause a velocity of about 0.148 feet per second through the 7-16 inch holes, assuming that they were all unobstructed and full open.

By constant work a supply of 1,000,000 gallons an hour was obtained, or about two-fifths of the ordinary morning demand. Openings were cut through two of the screens with chisels as soon as possible, the first being made at about 8 a. m., and the second shortly after 9 a. m., thus letting the ice onto the pumps direct. It was feared that the pump valves would become clogged, but they did not, and the supply and pressure throughout the city was again normal at 10:30 a. m.

No trouble had ever before been experienced at this point, and was entirely unexpected, especially as the screen area had been nearly doubled during the season and new basin outlets constructed with larger openings to admit water to the conduits. Each of the three new outlets has a single opening reaching to the surface, while one of the two old outlets had several openings submerged four or five feet, and the other a single opening reaching to the surface, the same as in the new outlets. To prevent future trouble of a similar nature the basin outlets will be protected by platforms and screens to distribute the flow and prevent the entrance of water near the surface; also the strainers will be provided with sections which may be easily removed in case of necessity.

The river intakes were frequently stopped with ice during the winter, and the emergency valve and conduit used to supply the settling basin.

Office.

The field and office work and shop inspection has been carried on harmoniously and efficiently by the employes of the department. George H. Fenkell, the former chief draftsman, resigned his position in August to accept that of Civil Engineer to the Commissioners of Water Works in the City of Erie, Pa. As the works expand greater care and system is required in conducting the routine duties of the office and in caring for the increasing volume of records. For this work the department is fortunate in having in its personnel men of skill and experience, and it is the policy of the department to increase the efficiency of these men by the introduction of new methods and labor-saving devices wherever possible.

Future Extensions.

In times past there has been a false tendency to consider the entire water works system completed with the completion of each important extension or improvement. The truth is, the system must be continuously extended to keep pace with the continuous growth of the city, and experience shows that the average cost of plant to give satisfactory service is about $21.00 per person supplied. The actual valuation of the works and number of persons supplied is given for each census year beginning with 1860 as follows:

YEAR.	PERSONS SUPPLIED.	TOTAL VALUATION OF WORKS.	VALUATION PER CONSUMER.
1860	36,279	$ 689.783.45	$19.01
1870	74,236	1,176.076.60	15.84
1880	116,369	2,750,700.39	23.63
1890	206,055	3,711,835 40	18.01
1900	289,499	6,145,921.04	21.23
1903	327,029	7,076,946.84	21.64
1920	* 567,400	11,915,400.00	21.00

* Estimated at ratio of 40% per decade.

The valuation per consumer in 1870 was exceedingly low and the service rendered exceedingly poor, it being necessary to construct new works and mains at large expense, which raised the valuation above the average as shown in 1880.

The valuation in 1890 was again low, and it will be remembered that the pressures at that time were very low, requiring new pumps and mains, which again brought the valuation to more than the assumed average of $21.00 per person supplied.

Prof. E. W. Bemis, Superintendent of the Cleveland Water Works, estimates the present structural value of that plant at about $22.00 per consumer, after deducting the cost of tunnels and $2,359,000 for depreciation. The average of $21.00 assumed for Detroit therefore seems conservative.

The increase in population for five of the principal lake cities from 1890 to 1900 was as follows: Chicago, 54.4 per cent; Cleveland, 46 per cent; Detroit, 40.5 per cent; Milwaukee, 39.5 per cent; Buffalo, 37.8 per cent.

The estimated population of Detroit in 1920 will be 567,400, based on an increase of 40 per cent per decade, and the value of the plant at $21.00 per person will be nearly $12,000,000. As the present valuation is approximately $7,000,000, the annual expenditure for the next 17 years will average, say $290,000 per year. Any comprehensive financial arrangement entered into must provide for raising this sum annually by bonds, rates or otherwise. The expenditures will be for enlargements and improvements as they are from time to time required.

Recommendations.

1. Increase the size of the proposed main to be laid in Congress, Brooklyn, River, Hoffman and Fort streets, between Sixth and Vinewood, from 36-inch to 42-inch on account of the rapid development of manufacturing interests

along the river front and the probable early extension of the western city limits. This line will be 9,007 feet long, and its estimated cost is $140,000. It will also be necessary to lay 1,580 feet of 16-inch pipe in River street, between Second and Sixth, to increase the supply to the proposed new 42-inch main.

2. Provide increased fire protection in the neighborhood of Harper avenue and the Belt Line Railroad, where several large factories are being built. Also in the vicinity of Twelfth and Putnam for the same reasons.

3. The adoption of a liberal policy relative to the curing of dead ends in the distribution system.

All of which is respectfully submitted.

CLARENCE W. HUBBELL,
Civil Engineer.

REPORT OF SUPERINTENDENT OF METERS AND INSPECTION.

Detroit, July 1, 1903.

To the Board of Water Commissioners:

Gentlemen—In compliance with the rules and regulations of your honorable body, I herewith report the work done in the Meter, Inspection and Service Cocks Departments from July 1, 1902, to July 1, 1903:

NUMBER OF METERS PLACED FROM JULY 1, 1902, TO JULY 1, 1903.

	SIZES.								
	⅝ in.	¾ in.	1 in.	1½ in.	2 in.	3 in.	4 in.	6 in.	Total
In service July 1, 1902	3,115	1,039	913	283	229	96	52	11	5,738
Placed during the year ending July 1, 1903	167	46	63	27	27	15	7	5	357
	3,282	1,085	976	310	256	111	59	16	6,095
Removed during the year ending July 1, 1903	172	16	32	9	14	3	2	......	248
Total number in service July 1, 1903	3,110	1,069	944	301	242	108	57	16	5,847

IN SERVICE JULY 1, 1903.

KIND.	SIZES.								
	⅝ in.	¾ in.	1 in.	1½ in.	2 in.	3 in.	4 in.	6 in.	Total
Thomson	3,071	1,051	881	291	219	97	43	16	5,669
Crown	25	12	30	8	6	4	3	......	88
Hersey	1	2	24	2	8	2	7	......	46
Worthington	7	4	9	......	9	5	2	......	36
Union Rotary	5	......	......	......	......	......	1	......	6
Buffalo	1	......	......	......	......	......	......	......	1
Venturi	......	......	......	......	......	......	1	......	1
Aggregate	3,110	1,069	944	301	242	108	57	16	5,847

Indicators attached to hydraulic elevators.. 38

METERS IN STOCK.

KIND.	SIZES.						
	¾ in.	1 in.	1¼ in.	2 in.	3 in.	4 in.	Total
Thomson	14	13	9	2	2	......	40
Crown	......	......	2	2	......	1	5
Hersey	......	8	.....	1	......	1	10
Aggregate	14	21	11	5	2	2	55

Valuation of meters in stock July 1, 1903		$1,186 00
Valuation of material on hand July 1, 1903		525 31
Valuation of tools, etc., July 1, 1903		496 92
Valuation of horses, wagons, etc., July 1, 1903		346 00
Valuation of furniture, fixtures, etc., July 1, 1903		105 00
Total valuation of stock on hand July 1, 1903		$2,659 23
Valuation of meters in service July 1, 1902		$98,663 75
Deduct 2 per cent. for depreciation in value	$1,973 27	
Deduct for meters sold	636 34	2,609 61
		$96,054 14
Add amount expended 1902-3 for meters placed		4,894 33
Total valuation of meters in service July 1, 1903		$100,948 47

SUMMARY OF TOTAL AMOUNT EXPENDED IN THE METER DEPARTMENT FOR THE YEARS 1889 TO JULY 1, 1903, INCLUSIVE.

	1889	1890	1891	1892	1893	TOTAL
Meters	$11,175 00	$18,700 00	$6,501 55	$12,371 82	$6,987 43	$ 55,735 80
Supt. and labor	1,734 10	8,510 57	4,841 49	8,269 17	8,980 48	32,335 81
Material, tools, etc	637 26	2,982 14	872 99	2,132 93	1,650 33	8,275 65
Freight, hauling, etc	98 05	408 97	197 11	244 08	165 12	1,113 33
Horses, wagon, etc	....	....	....	547 24	184 50	731 74
Aggregate	$13,644 41	$30,601 68	$12,418 14	$28,565 24	$17,967 86	$ 98,192 33

	1894	1895	1896	1897	1898	TOTAL
Meters	$8,824 08	$9,235 11	$10,435 76	$7,955 97	$1,790 75	$ 38,241 67
Supt. and labor	6,672 20	6,647 89	6,340 08	6,078 78	4,531 11	30,270 06
Material, tools, etc	1,833 01	1,384 85	1,035 15	927 90	568 99	5,749 90
Freight, hauling, etc	201 18	71 40	91 11	67 90	13 16	444 75
Horses, wagon, etc	383 07	248 60	238 51	330 80	187 50	1,388 48
Aggregate	$17,913 54	$17,587 85	$18,140 61	$15,361 35	$7,091 51	$ 76,094 86

	1899	1900-1	1901-2	1902-3		TOTAL
Meters	$2,265 70	$4,172 61	$4,801 12	$ 4,316 72	....	$ 15,556 15
Supt. and labor	4,223 54	6,369 45	4,597 96	5,319 54	....	20,510 49
Material, tools, etc	375 32	617 71	521 69	577 61	....	2,092 33
Freight, hauling, etc	6 85	15 00	1 60	3 37	....	26 82
Horses, wagon, etc	244 25	321 15	220 10	238 00	....	1,023 50
Aggregate	$7,115 66	$11,495 92	$10,142 47	$10,455 24	....	$213,496 48

One hundred and nine (109) meters were added to the system during the year, making the total number now in service 5,847. Three hundred and fifty-seven meters were placed, and 248 were removed; 146 of the meters removed were from premises that now pay by assessment, and which formerly paid by meter rates. These meters have been placed in saloons, stores and other business places. Forty-one premises on which meters were allowed to remain after said places were transferred to the assessment roll have been changed back to meter rates again on account of their large consumption. Five hundred and ten meters still remain on assessed premises, as against 656 last year, and 1,113 July 1st, 1899, that being the time a resolution was adopted "that no more private residences should be metered requiring less than a one-inch meter in size, unless the consumer paid for both the meter and installing the same." Since that time 240 consumers have been changed back to the meter roll on account of their large consumption, as before stated. The following table will give an idea of the difference in consumption between paying by meter and assessed rates, as demonstrated by many of those who have tried both ways.

STREET.	One Year's Consumption when paying Meter Rates.	One Year's Consumption when paying Assessed Rates.	One Year's Consumption after being placed back on Meter Rates.
	Gallons.	*Gallons.*	*Gallons.*
Lyman Place	76,500	327,750	78,500
Delaware Avenue	65,250	345,750	112,500
Delaware Avenue	55,500	316,500	68,000
Euclid Avenue	69,750	192,750	56,250
Pingree Avenue	75,000	209,250	126,750
Putnam Avenue	48,750	337,500	30,000
Putnam Avenue	63,750	220,500	86,250
Fort Street East	78,750	235,750	96.750
Hastings Street	58,750	856,500	146,500
Total	592,000	3,042 250	801,500

The above places were taken at random from the meter roll, and are a fair sample of the 240 that were transferred back to said roll for excessive consumption.

You will notice the great difference in consumption while consumers were paying for the waste and when the Water Works were paying for it. It is passing strange that some people will husband their own funds so carefully while they throw to the four winds that which belongs to the city at large, something that should be as economically cared for as though it belonged to themselves individually.

The showing is certainly an object lesson in favor of the meter system. While many of the meters that remain on premises that are assessed show a consumption below the normal, the fact can be accounted for in a great measure by the restraining influence of the meter, the consumer knowing that all waste is recorded as well as that used legitimately. Of course many are not so affected as shown by the foregoing table. There is an increased consumption, in most cases, during the second period on the meter roll, but they will eventually get back to the original quantity, if the conditions remain the same as they were when the meter was first placed.

The consumption at Belle Isle for the past year was 212,394,600 gallons, while it only required 227,879,696 gallons to supply the villages of Delray, River Rouge, and Highland Park one year, Woodmere six and Hamtramck four months. It hardly seems possible that it should require nearly as much water to supply Belle Isle as it does the five villages mentioned, with their large factories and over 1,800 private taps. As all of the villages are metered there is no question about the figures being correct.

There are two six-inch meters which register the water for Belle Isle Park. They have been in service since November 2nd, 1893, and have registered 1,380,644,188 gallons to date. These meters, without having any repairs (other than a portion of the train gear being replaced, requiring about three hours' time), were tested a few weeks ago, and on a ⅝-inch flow, and 100 cubic feet run, one was 3 per cent and the other 13 per cent slow. The test was a severe one for that size meters, and I have no doubt but what they are registering very nearly correct on a full flow. The difference in percentage of loss is caused by the greater quantity of water being registered by one of the meters, being about one-third more, which meter necessarily shows the greater wear.

The consumption for the past year at Grace Hospital was 25,428,900 gallons, "St. Mary's" 19,106,400 gallons, and "Harper" 14,059,100 gallons. You will notice that, although Harper Hospital being much the larger of the three, yet their consumption is the least. The only way to account for Grace Hospital using nearly double that of "Harper" is through waste, and as all hospitals are on the charity list, the waste is hard to control. If they were allowed a stated quantity (which should be bountiful) each year, and then be obliged to pay for all in excess of that amount, it would undoubtedly stop much of the waste that is now going on.

We have deducted only two instead of five per cent this year for depreciation in value of the meters in service, which, from our past experience, seems to be about the proper amount. The meters are so constructed that all of the different parts are interchangeable, so that when any part becomes worn or defective it can be replaced with a new one if necessary, making the life of a meter almost continuous.

Inspection.

No changes have been made in this department since our last report. A portion of the work done by the inspectors is shown in the following table.

New connections examined—City	2,350
" " " Woodmere Village	325
" " " Hamtramck Village	134
" " " Highland Park Village	14
Extensions examined	1,098
Buildings inspected	5 379
Fixtures inspected	5,334

Let on vacancy	387
Let on non-payment	328
Let on new connections	1,966
Building tax notices	3,309
Delinquents notified	22,052
Shut off for non-payment	457
Shut off for vacancy	434
Inquiries for collectors	7,250
Meters read	26,499
Meter bills delivered	18,453
Examination for leaks	11,250
Leaks reported	963
Shut off for leaks	307
Total	108,289

Service Cocks.

Two thousand three hundred and fifty (2,350) service connections were made during the past year, being 242 more than for the previous year. There were 79 discontinued and 31 transferred to Hamtramck village, that being the number of taps in that portion of Hamtramck that is now incorporated as a village. The total number of service connections in the city is now 61,465.

The following tables will show the number and sizes of the taps inserted in the different wards during the past year, and also the total number in the city on July 1st, 1903:

TABLE showing the number and sizes of taps inserted in each ward from July 1, 1902, to July 1, 1903.

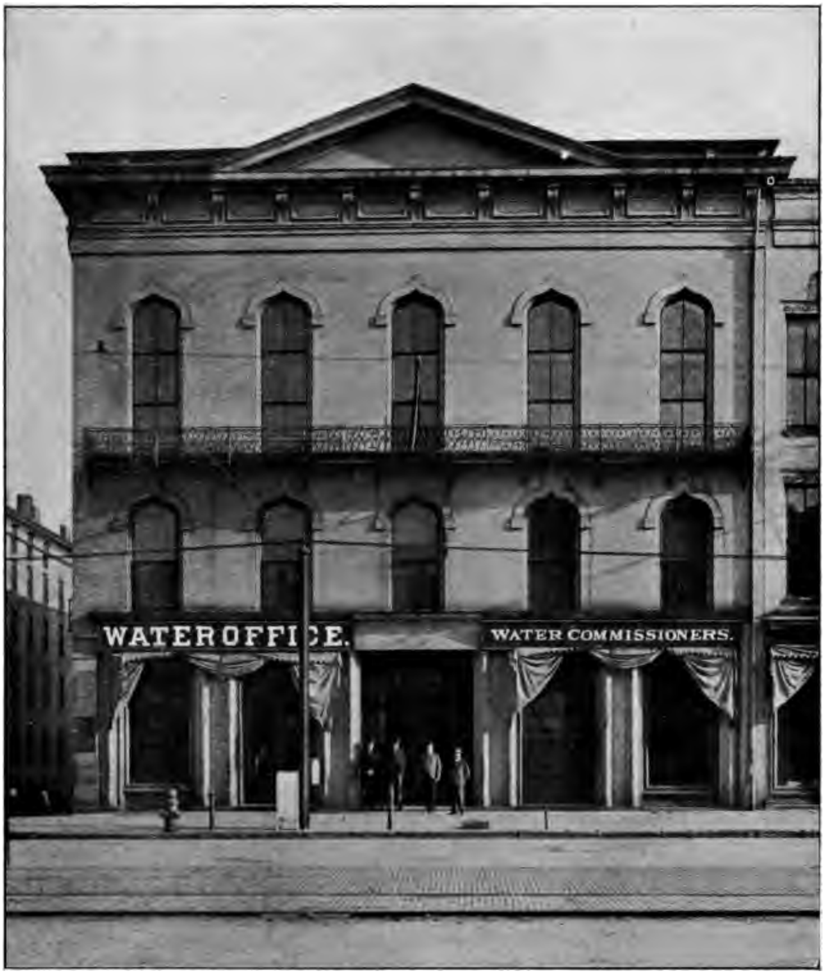
INSERTED.	WARDS.																	Total.
SIZES.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
⅝-inch................	48	10	61	12	89	30	40	57	128	71	113	90	132	131	79	404	391	1,886
1-inch................	59	26	31	23	14	25	19	9	5	31	10	14	15	19	24	14	67	405
2-inch................	4	2	3	3	...	1	...	2	...	...	...	1	4	3	2	1	7	33
3-inch................	2	...	1	...	1	1	1	1	...	...	...	2	2	...	2	...	...	13
4-inch................	1	1	...	...	...	...	...	...	1	1	1	...	...	...	2	...	...	7
6-inch................	...	...	...	...	...	...	...	1	1	1	...	1	1	...	1	...	...	6
Aggregate........	114	39	96	38	104	57	60	70	135	104	124	108	154	153	110	419	465	2,350
DISCONTINUED.																		
⅝-inch................	7	8	9	6	2	4	4	1	4	...	7	7	...	3	2	1	...	65
1-inch................	2	2	2	...	...	...	...	1	...	...	2	3	...	1	1	...	...	14
Aggregate........	9	10	11	6	2	4	4	2	4	...	9	10	...	4	3	1	...	79

TABLE SHOWING THE NUMBER OF SERVICE CONNECTIONS IN USE JULY 1ST, 1903.

SIZES.	IN USE JULY 1, 1902.	ADDED 1902-3	LESS TRANSFERRED TO HAMTRAMCK	DISCONTINUED 1902-3.	TOTAL.
⅝ inch	43,335	1,886	24	65	45,132
1 "	15,112	405	5	14	15,498
2 "	386	33	....	....	419
3 "	210	13	....	....	223
4 "	146	7	2	....	151
6 "	35	6	....	....	41
10 "	1	....	....	....	1
Aggregate	59,225	2,350	31	79	61,465

TABLE showing the service connections in the villages of Highland Park, Delray, River Rouge, Woodmere and Hamtramck; also the consumption in each.

	IN USE JULY 1, 1903.						INSERTED IN 1902-3.						TOTAL.	TOTAL CONSUMPTION.	
	⅝-in.	1-in.	2-in.	3-in.	4-in.	6-in.	⅝-in.	1-in.	2-in.	3-in.	4-in.	6 in.		Gallons.	
Highland Park.......	47	44	1	1	.....	.....	7	5	.....	.....	.....	.....	105	17,135,932	1 year.
Delray...............	646	76	4	2	1	4	175	12	2	1	.....	.....	923	159,294,828	1 year.
River Rouge.	216	3	.....	.....	1	.....	77	3	.....	.....	.....	.....	300	22,556,688	1 year.
Woodmere	.....	.....	.....	.....	.....	.....	355	27	1	.....	1	.....	384	12,775,092	6 months.
Hamtramck	24	5	.....	.....	2	.....	134	.....	.....	.....	.....	.....	165	16,117,156	4 months.
Aggregate.....	933	128	5	3	4	4	748	47	3	1	1	.....	1,877	227,879,696	



OFFICE BUILDING.

The foregoing villages are all metered. Delray, River Rouge and Woodmere do their own tapping, with the exception of connections over one inch in size, which are made by our force. These villages also do their own inspection, being governed by our rules and regulations. We do the tapping for Highland Park, but they do their own inspection. In Hamtramck we do the tapping and inspection, and will continue to do so until their pipeage system is completed, when I presume they will take full control, as has been done in the other villages.

Attached to this report is a complete list of tools on hand and an itemized account of material in stock in the meter and inspection departments on the first day of July, 1903.

All of which is respectfully submitted.

T. R. PUTNAM,
Supt. Meters and Inspection.

REPORT OF CHIEF ENGINEER AT PUMPING WORKS.

Detroit, July 1, 1903.

To the Board of Water Commissioners:

Gentlemen — I have the honor to submit the Engineer's report for the year ending June 30, 1903.

The following table shows the number of gallons of water pumped, and cost of fuel for the years named:

YEAR.	GALLONS OF WATER PUMPED.	COST OF FUEL CONSUMED.	AVERAGE DAILY DELIVERED.
1852	235,840,271	....	646,411
1853	303,531,743	$ 2,129 37	931,594
1854	376,265,126	2,271 34	1,030,866
1855	542,807,364	3,825 81	1,487,143
1856	692,124,305	4,017 44	1,896,231
1857	697,190,523	3,993 20	1,909,837
1858	718,091,207	3,655 20	1,967,373
1859	782,112,587	3,194 15	2,142,774
1860	870,036,451	4,196 21	2,383,580
1861	895,129,423	4,414 07	2,452,409
1862	994,945,829	3.150 95	2,725,878
1863	1,035,798,043	4,670 86	2,837,803
1864	1,018,390,256	7,647 62	2,839,078
1865	1,049,514,887	7,372 89	2,875,383
1866	1,196,317,922	9,349 16	3,277,583
1867	1,425,535,230	10,121 82	3,905,576
1868	1,666,545,125	11,379 23	4,507,248
1869	1,946,810,325	11,247 92	4,511,809
1870	1,866,060,068	12,713 78	5,112,493
1871	2,300,150,605	14,681 05	6,301,782
1872	2,782,292,578	17,736 86	7,601,392
1873	3,198,393,948	20,233 30	8,762,723
1874	3,289,872,635	20,431 71	9,013,350
1875	4,207,454,260	21,398 98	11,527,272
1876	4,065,134,470	19,832 89	11,107,499
1877	4,213,239,790	17,433 72	11,548,123
1878	4,345,743,330	10,943 82	11,906,146
1879	5,129,599,110	11,219 51	14,053,696
1880	5,552,965,310	12,276 60	15,172,036
1881	6,543,127,968	16,556 63	17,926,877
1882	6,284,000,742	18,156 16	17,261,440
1883	7,379,327,188	16,495 99	20,217,334
1884	8,510,614,140	19,877 07	23,253,044
1885	9,970,829,580	21,341 48	27,317,341
1886	10,576,571,254	20,387 24	28,976,907
1887	13,168,859,808	35,882 83	36,079,166
1888	14,380,166,670	39,568 66	39,397,716
1889	12,875,334,453	34,413 31	35,274,888
1890	12,120,944,532	31,852 40	33,209,067
1891	12,057,261,236	33,826 86	33,033,592
1892	12,476,612,482	31,034 40	34,182,499
1893	13,877,977,208	27,479 93	38,021,855
1894	13,649,779,605	29,283 47	37,396,656
1895	14,698,451,954	32,095 00	40,269,731
1896	13,254,369,371	31,186 17	36,215,123
1897	12,928,821,326	17,355 58	35,421,428
1898	14,278,682,058	17,880 19	39,092,252
1899	16,348,062,701	19,011 67	44,789,212
1900	17,077,100,477	25,898 50	46,786,576
January 1 to July 1, 1901	8,849,732,755	16,881 31	48,893,551
July 1, 1901, to July 1, 1902	18,333,104,706	24,830 79	50,200,204
July 1, 1902, to July 1, 1903	18,757,682,360	26,909 99	51,390,911

The following tables show in detail the work done by each engine each month of the year:

ENGINE No. 1.

MONTHS.	Time run.		Revolutions.	Gallons Pumped.
	H.	M.		
July	490	50	285,937	395,865,012
August	431	55	250,682	334,412,460
September	342	40	198,404	261,402,534
October	640	25	370,220	546.487,710
November	720	....	414,250	641,259,000
December	433	05	250,202	329,431,938
January	415	30	238,945	244,937,910
February	375	10	220,490	243,961,590
March	591	35	350,490	490,468,200
April	364	....	214,428	187,525,638
May	142	45	83,068	108,405,408
June	319	40	192,295	234,404,562
Total	5,267	35	3,069,411	4,018,561,962

ENGINE No. 2.

July	84	....	52,913	59,020,968
August	38	45	22,988	18,758,208
September	83	10	50,971	67,740,216
October	287	20	172,748	240,457,368
November	391	45	233,662	306,022,992
December	123	25	74,533	95,948,088
January	551	10	355,682	538,979,952
February	574	40	375,563	548,634,792
March	270	40	168,188	227,216,568
April	......	....	....	....
May	408	45	255,282	335,418,192
June	310	40	197,471	273,925,848
Total	3,124	20	1,960,001	2,712,123,192

ENGINE No. 3.

July	595	....	360,270	635,080,820
August	733	25	443,780	789,678,200
September	687	05	406,820	722,007,260
October	243	30	143,490	254,193,996
November	......	....	....	....
December	619	30	375,220	666,992,290
January	741	20	454,820	818,193,130
February	657	....	405,310	722,910,342
March	278	20	175,043	306,914,682
April	714	....	448,930	779,416,330
May	620	10	396,279	692,389,056
June	599	05	373,300	650,893,070
Total	6,488	25	3,983,262	7,038,669,176

ENGINE No. 4.

July	731	40	639,165	501,744,525
August	744	....	643,265	504,963,025
September	720	....	609,175	478,202,375
October	721	15	588,330	461,839,050
November	720	....	574,625	451,080,625
December	744	....	632,235	496,304,475
January	216	....	178,361	140,013,385
February	102	10	88,502	69,474,070
March	737	35	622.290	488,497,650
April	683	50	606.560	476,149,600
May	741	50	650,110	510,336,350
June	597	....	521,940	409,722,900
Total	7,459	20	6,354,558	4,988,328,030

TOTAL EXPENSE PUMPING WATER, 1902-03.

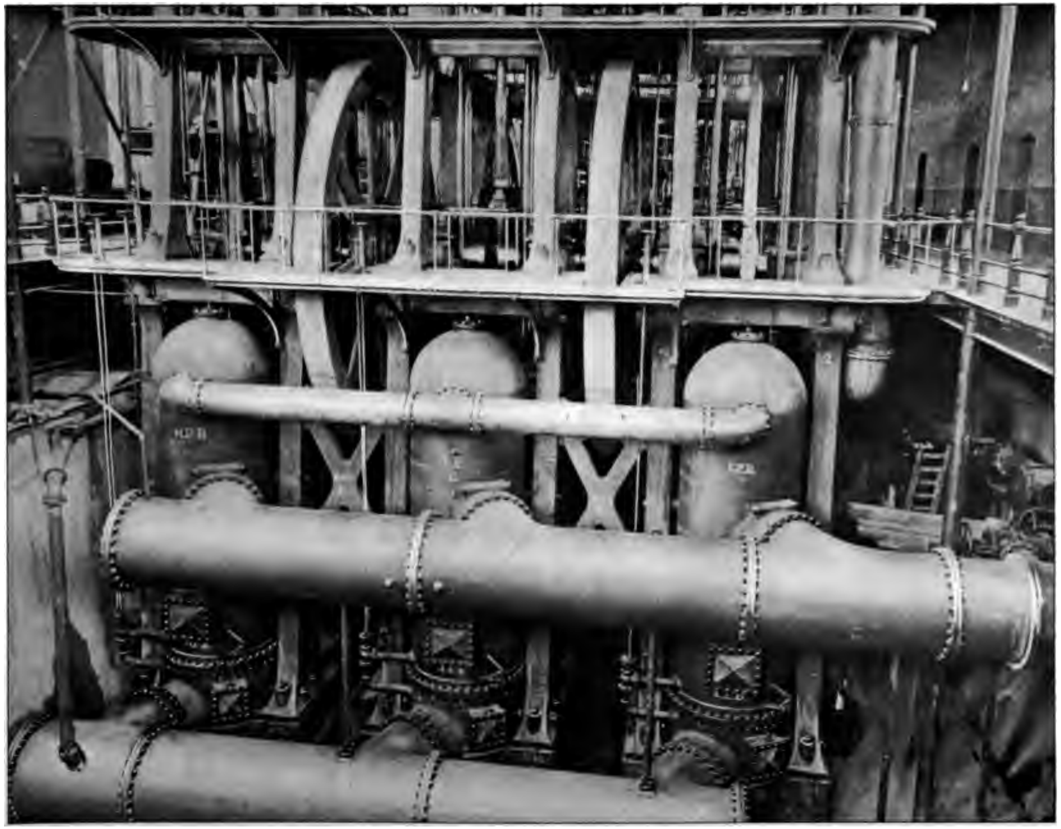
Fuel coal consumed	$26,909 99
Salaries, engineers et al	27,169 25
Repairs, boiler and engines	1,373 65
Supplies, boiler and engine	368 87
Supplies, kerosene and gasoline	8 75
Engine oil and grease	347 22
Waste and rags	217 63
Packing and hose	317 97
Electric supplies	6 07
Boiler inspection and insurance	326 00
Ice	21 75
Telephone	51 28
Printing and stationery	22 50
Paint, lead, etc	39 88
Hay and bedding	11 50
Horse shoeing	8 00
Freight	1 62
Advertising	20 23
Miscellaneous	125 99
	$57,348 15

The cost of fuel per million gallons pumped was $1.43, and per million gallons pumped 100 feet high was $1.21. The table shows that the amount of water pumped during the year was 18,757,682,360 gallons, making the daily average 51,390,911, which is an increase of 2% compared with the preceding year.

The total expense during the year for pumping water, including maintenance, heating station, library and greenhouse, hoisting coal, etc., was $57,348.15, thus making the cost per million gallons pumped $3.06.

The station duty of coal consumed for all purposes during the year was 81,326,014.

The engines are in a fair condition, and have run along without any accidents this year, having made nothing but minor repairs, not knowing at what time the reserve engine



LOWER PORTION NEW ALLIS-CHALMERS ENGINE.

would be required to be put in service, but considerable repairs will be required in the near future.

The two new Allis-Chalmers pumps are now about completed, one of which is ready for trial, but they will be of little use to those in the high district for some time, for it requires time to adjust and finish up, hoping in the near future to satisfy all consumers with sufficient head of water.

The boilers and furnaces are all in good working condition; only minor repairs have been required the past year.

The engine house is in a good condition; there has been a new stone floor laid with gutters along the walls to receive the pipes for the new radiators and other purposes.

The boiler house is in good condition, the interior having been repainted. The new cement floor and the tracks laid flush with the floor was a much needed improvement.

The coal sheds are in a good condition, excepting the slate roof, which will need some repairs. There have been new cement floors laid in place of the plank floors.

The wash rooms and lockers which were recently installed were quite necessary, and are appreciated by the employes.

Respectfully submitted,

URIAH GOULD,
Chief Engineer.

REPORT OF THE SUPERINTENDENT OF CONSTRUCTION.

To the Honorable Board of Water Commissioners:

Gentlemen—In accordance with your regulations, I have the honor to submit the following report, as to the general condition of the work and the progress made in the construction department during the past year.

Work performed at the Pumping Station during the year ending June 30th, 1903.

Building 614 ft. 11 in. of 10-ft. Conduit	$13,932 71	
Work on the open ditch, 10 ft. Conduit	8,497 92	
Work on the shore shaft, 10-ft. Conduit	6.993 71	
Miscellaneous work, 10-ft. Conduit	502 35	
		$29,926 69
Old 6-ft. Conduit, rebuilding		3,739 57
Old 5-ft. Conduit, repairs		4 38
Work on Junction Well No. 1	$47 17	
Work on Junction Well No. 2	18 71	
Work on Junction Well No. 3	1,037 60	
		1,103 48
Work on Strainer Well No. 3	$21 20	
Work on Strainer Well No. 4	390 08	
Work on Strainer Well No. 5	150 98	
Work on Strainer Well No. 6	497 49	
		1,059 75
Work on Emergency Well		84 94
Work on Basin Intake No. 2		160 90
Work on Coffer Dam Intake No. 4		1,630 74
Pumping water from Wells and Conduits		1,258 52
Setting Hydrants, Gates and connecting 24-in. and 42 in. pipes with new pumps in engine room		3,756 96
Excavating and bolting 12-in. and 42-in. Ys		1,565 63
Concreting floors, laying drain pipe and railroad track in coal sheds and boiler room		3,138 31
Concrete floor at Water Works gate		62 23
Building railroad and drains in grounds		1,283 55
Miscellaneous work and improvements at the grounds		2,504 37
Clearing ice from the strainers		13 56
		$51,293 58

Distribution System.

The pipe laid outside of the city during the past year was as follows:

Village of Delray...........	2,583
Village of Woodmere.......	106,896
Village of River Rouge....	1,395
Village of Hamtramck.....	40,653
	151,527 feet, or $28\frac{3687}{5280}$ miles.

Inside the city we laid 37,828 feet, and discontinued 957 feet, making a net increase inside of the city of 36,881 feet, or $6\frac{5201}{5280}$ miles.

The net increase in the entire system is 188,408 feet, or $35\frac{3608}{5280}$ miles.

The Board now owns $68\frac{4224}{5280}$ miles outside of city and inside $548\frac{2356}{5280}$ miles, making a total of pipe in system of $617\frac{1300}{5280}$ miles of the different sizes, as follows:

SIZE OF PIPE, INCHES.	MEASURED LENGTH IN FEET TO JULY, 1902.	LENGTH IN FEET LAID FROM JULY, 1902, TO JULY, 1903.	DISCONTINUED FEET FROM JULY, 1902, TO JULY, 1903.	TOTAL LENGTH IN FEET TO JULY, 1903.
45	103	....	....	103
42	73,379	777	....	74,156
36	3,602	3,980	....	7,582
30	54,494	53	....	54,547
24	84,587	253	....	84,840
20	393	....	....	393
18	87	....	....	87
16	53,829	473	....	54,302
12	37,562	8,427	....	45,989
10	163,655	8,598	....	172,253
8	324,716	16,467	....	341,183
6	1,395,798	105,796	....	1,501,594
4	810,633	44,541	957	854,217
3	63,221	....	....	63,221
2	4,593	....	....	4,593
Total,	3,070,652	189,365	957	3,259,060

Cost of Flushing.

March 23rd to May 16th, 1903, 41 blow-offs.

Labor	$492 41
Teaming	153 75
Telephone Bill	132 00
Oil	3 80
	$781 96

Average per blow-off, $19 04+.

At the close of this report will be found a descriptive list of lines of pipe laid, with locations, length, sizes and cost of construction in detail.

The total number of gates now in system amounts to 7,382 of different kinds and sizes shown in the following table:

GATES IN SYSTEM JULY 1st, 1903.

Size.	42-In.	36-In.	30-In.	24-In.	20-In.	18-In.	16-In.	12-In.	10-In.	8-In.	6-In.	4-In.	3-In.	Total.
Murdock	5	...	11	16	...	...	27	47	188	455	1,630	1,320	11	3,710
Flowers	20	...	9	18	...	...	...	...	39	52	245	436	20	839
Galvin	...	1	7	12	...	...	21	...	13	31	171	253	1	510
Michigan Brass and Iron Works	10	...	9	2	11	...	13	11	63	151	776	111	...	1,157
Pittsburg	...	...	...	15	...	2	1	1	10	11	31	122	...	193
Roe Stephens	...	...	...	...	...	...	...	6	....	4	43	....	...	53
Eddy	...	...	...	...	...	...	...	...	15	4	6	9	...	34
Scowden	...	...	...	...	...	...	...	...	8	19	48	12	...	87
Ludlow	...	...	...	...	...	...	...	...	1	2	9	5	...	17
St. Louis	...	...	...	...	...	...	...	3	....	....	....	....	...	3
Detroit Water Works	8	3	3	4	...	...	1	7	28	69	420	187	...	730
Prong	...	...	...	...	..	...	...	...	....	....	1	....	...	1
Boston	...	...	...	...	...	...	...	...	....	1	1	....	...	2
Newport	...	...	...	...	...	...	...	...	....	....	....	1	...	1
No Name	...	..	...	...	...	...	...	...	....	3	9	32	1	45
Total	43	4	39	67	11	2	63	75	365	802	3,390	2,488	33	7,382

GATES SET FOR SHUT-OFFS FROM JULY, 1902, TO JULY, 1903.

NAME.	4-in.	6-in.	8-in.	10-in.	12 in.	16-in.	24-in.	30-in.	36-in.	40-in.	TOTAL.
Detroit Water Works—City	61	91	15	8	1	1	4	3	2	4	190
Detroit Water Works—Woodmere	10	76	13	7	4						110
Detroit Water Works—Hamtramck	15	56	8	3							82
Detroit Water Works—River Rouge	1	2									3
Detroit Water Work4—Delray		2									2
Total	87	227	36	18	5	1	4	3	2	4	387

SHUT-OFF GATES DISCONTINUED FROM JULY, 1902, TO JULY, 1903.

NAME.	4-in.	6-in.	8-in.	TOTAL.
Murdock	6	1	2	9
Michigan Brass and Iron Works	4	......	......	4
Flowers	3	......	......	3
Pittsburg	1	......	......	1
Galvin	2	......	......	2
Ludlow	1	......	......	1
Detroit Water Works	1	......	......	1
Total	18	1	2	21

The following is a statement of examinations, operations and repairs of gates, etc., from July, 1902, to July, 1903.

5,736 gates examined.
115 gates found out of order.
74 gates repaired.
110 gate wells built over old lines.
304 gate wells built over new lines.
7,030 blow-offs were operated for flushing dead ends.
1,719 gates operated for flushing.
2,847 wells in system.
23 tees set for Fire Department.

TOTAL AND AVERAGE COST OF WELLS BUILT OVER GATES.

	OVER GATES IN OLD LINES		Average.
5	gate wells, 10″, 12′ and 16″	$ 133 00	$26 60
105	gate wells, 4″, 6″ and 8″	2,627 18	25 02+
110		$2,760 18	
	OVER GATES IN NEW LINES.		
4	gate wells, 42″	$1,752 42	$438 10
2	gate wells, 36″	672 41	336 20
2	gate wells, 30″	557 57	278 78
1	gate well, 24″	205 01	
13	gate wells, 10″, 12″ and 16″	303 23	23 32
282	gate wells, 4″, 6″ and 8″	5 276 90	18 00+
304		$8,767 54	

LEAKS IN MAINS FROM JULY, 1902, TO JULY, 1903.

LOCATION.	SIZE.	COST.
Pumping Works Grounds	42-inch.	$36 00
Hurlbut and Mack	42 "	35 59
Sylvester and Boulevard	42 "	665 12
Cass and Elizabeth	10 "	39 83
Hurlbut and Jefferson	42 "	354 65
Hurlbut and Kercheval	24 "	243 27
Leaks in 4-in., 6-in. and 8-in. mains	....	124 37
Delray Village	....	110 65
		$1,609 48

STATEMENT OF LEAKS, COMPLAINTS, ETC., FROM JULY, 1902, TO JULY, 1903.

MONTHS.	LEAKS.		COMPLAINTS.			SERVICE.	
	In Mains.	In Service Pipe.	No Water.	Bad Water.	Short Supply	Let On.	Shut Off.
1902							
July	8	18	10	11	6	3	9
August	8	20	3	......	1	8	3
September	5	12	3	5	4	2	4
October	12	21	12	7	8	2	12
November	5	24	2	......	1	7	6
December	2	24	4	......	2	7	4
1903							
January	2	27	18	2	1	5	3
February	3	38	7	......	......	3	11
March	4	29	6	......	1	5	4
April	4	28	9	4	......	4	4
May	5	23	9	......	3	4	7
June	7	21	5	4	6	2	3
Total	65	285	88	33	33	52	70

PIPE LAID FROM JULY 1st, 1902, TO JULY 1st, 1903.

Date.	LOCATION OF PIPE.	Feet	Size.	COST OF CONSTRUCTION.												
				Pipe.	Advertising.	Specials.	Lead.	Gates.		Sundries.	Gatewells.	Hauling.	Repaving	Sup. & Eng.	Labor.	Total Cost.
								No.	Cost.							
Aug. 7, 1902	Adele, from 6 ft. e of St. Aubin to 302 ft. s of s of Trombley............	33	6 in.	$ 13 32	....	$ 8 55	$ 2 91	....	....	$ 40	....	$ 1 25	....	....	$ 23 90	$ 50 33
Aug. 20, 1902	Annexation, from 5 ft. w of e of McKinstry to 751 ft. w of w of same..	777' 8"	6 in.	313 98	....	10 33	21 58	....	21 00	1 92	19 02	3 50	....	38 88	287 50	717 71
Nov. 12, 1902	Annexation, from 25 ft. e of w of Campbell to 339 ft. e of e of same	380	6 in.	153 42	....	6 14	10 38	....	21 00	2 62	19 44	1 70	....	19 00	99 00	332 70
May 1903	Alger, from 2 ft. e of e of Brush to 121 ft. e of e of same...............	119	6 in.	57 95	....	....	4 15	....	....	46	....	1 75	....	5 95	28 00	98 26
June 5, 1903	Abbott, alley s of, from 3 ft. w of e of First to 14 ft. w of e of same....	52	6 in.	25 32	....	10 77	5 64	....	29 00	1 86	45 56	1 25	......	......	79 36	198 76
May 18, 1903	Adair, frim 9 ft. s of s of Woodbridge to 9 ft. s of n of Jefferson..........	385	10 in.	342 52	....	68 39	35 24	....	103 65	3 58	61 08	8 88	....	19 25	391 56	1034 15
Aug. 17, 1902	Belvidere, from 316 ft. 5 in. s of s of Gratiot..........................	376	6 in.	151 81	....	6 74	12 24	....	21 00	38	19 07	1 50	....	18 80	133 13	364 67
Oct. 6, 1902	Belvidere, from 9 ft. s of n of Gratiot to 305 ft. n of n of same......	314	6 in.	126 77	....	7 51	8 30	....	28 73	78	19 48	2 45	......	15 70	94 94	304 66
Apr. 18, 1903	Belvidere, from 306 ft. n of n of Gratiot to 718 ft. n of n of same, also from 5 ft s of s of Mack to 678 ft. n of n of same........	412 683	6 in.	199 01 330 32	....	5 31 16 46	13 49 22 83	... .	14 50	3 54 2 24	19 65	3 25 3 75	....	20 60 34 15	138 06 147 38	383 26 591 28
May 6, 1903	Boulevard, from 4 ft. w of Woodward to 45 ft. w of e of Cass.	411	6 in.	198 25	....	10 01	15 56	....	....	1 43	21 52	4 50	....	20 55	104 00	375 82
June 3, 1903	Belvidere, from 13 ft. s of n of Medbury to 525 ft. s of s of same......	572	6 in.	277 55	....	9 92	16 60	....	11 50	2 58	....	2 75	....	28 60	97 82	448 32
July 16, 1902	Congress, alley s of, from 22 ft. w of e of Shelby to 172 ft e of e of same	204	6 in.	80 63	....	19 34	10 46	....	7 73	1 94	25 32	75	... ...	....	131 62	277 79
Aug. 10, 1902	Cavalry, from 26 ft s of n of River to 26 ft. 10 in. n of n of same......	389	6 in.	157 05	... .	13 14	13 94	....	21 00	40	18 93	2 92	....	19 45	103 19	350 02
Aug. 20, 1902	Cavalry, from 22 ft s of n of Porter to 25 ft. s of n of Regular..........	511	6 in.	206 32	....	9 64	17 93	....	42 00	84	38 56	1 81	....	25 55	137 47	480 06
Oct. 18, 1902	Canton, from 23 ft. s of n of Stewart to 31 ft. n of n of Sylvester.......	492	6 in.	198 65	....	8 14	14 53	...	28 73	2 33	18 41	2 50	....	24 60	104 88	402 77
Oct. 10, 1902	Collins, from 30 in. well to sewer in alley s of Superior.................	130	4 in.	32 46	. ...	1 02	....	...	....	41	....	1 25	....	....	78 14	113 28
April 4, 1902	Canfield, from 34 ft. w of e of Twelfth to 36 ft. e of w of Avery...........	554	6 in.	223 13	....	7 29	18 68	....	21 00	7 66	20 20	4 50	....	27 70	146 50	476 66

PIPE LAID FROM JULY 1st, 1902, TO JULY 1st, 1903—CONTINUED.

Date.	LOCATION OF PIPE.	Feet.	Size.	COST OF CONSTRUCTION.												
				Pipe.	Advertising.	Specials.	Lead.	Gates. No.	Gates. Cost.	Sundries.	Gate-wells.	Hauling.	Repaving	Sup. & Eng.	Labor.	Total Cost.
Nov. 22, 1902	Claremont, from 39 ft. 4 in. w of e of Hamilton Boulevard to 370 ft. w of w of Second	1,375	6 in.	$ 555 14	....	$ 11 57	$ 41 09	....	42 00	$ 4 60	41 81	$ 5 25	....	$ 68 75	$ 385 33	$1,155 54
May, 1903	Crane, from 47 ft. s of n of Sylvester to 183 ft. n of n of Forest	1,924	6 in.	930 25	....	22 48	66 40	....	29 00	3 37	38 58	9 75	....	$ 96 20	557 44	1,553 47
June 8, 1903	Congress, alley n of, from 8½ ft. w of w of Beaubien to 4 ft. e of e of same	68	6 in.	32 94	....	2 92	6 23	...	$ 29 00	1 88	$ 48 42	6 75	....	....	77 22	210 76
June 11, 1903	Campbell, from 169½ ft. w of n of Herbert to 285 ft. n of n of same	114½	6 in.	55 28	....	1 92	4 18	....	....	46	....	1 50	....	....	46 07	109 41
June 2, 1903	Chene and Erskine, cut out 6 in. gate	18	6 in.	8 69	....	2 36	1 31	....	14 50	22	20 60	50	....	....	8 16	56 34
Mar. 27, 1903	Jos. Campau and Mack, connecting 4 in. with 36 in. in Mack	19½	6 in.	9 76	....	15 28	3 74	....	32 00	48	24 81	50	....	....	17 63	104 20
May 11, 1903	Chene and Mack, connecting 6 in. with 36 in. in Mack	11 3	8 in. 6 in.	9 00	....	9 21	3 74	....	32 00	....	23 18	75	....	....	14 70	92 58
May 5, 1903	Chene, connecting 6 in. with 30 in. main	6⅛	6 in.	3 05	....	4 44	1 87	....	14 50	08	....	1 00	....	....	8 47	33 41
May 8, 1903	Chene, from 30 in. main to the Chene street sewer	7½	6 in.	3 66	......	6 65	1 87	...	14 50	08	29 11	....	....	....	18 09	73 96
May 13, 1903	Chene, from 30 in. main to the 30 in main in Scott street	53	30 in.	326 35	....	64 58	31 75	....	477 50	20 98	325 08	32 11	....	....	561 61	1,839 96
July 15, 1902	Durand, from 15 ft. w of e of Van Dyke to 234 ft. e of e of same	250	6 in.	100 94	....	5 18	10 79	....	28 73	74	18 83	2 75	....	12 50	95 06	275 52
Sept. 10, 1902	Dragoon, from 5 ft. 8 in. n of Battery to 202 ft. n of n of same	208	6 in.	84 83	....	....	7 14	....	21 00	1 45	20 52	3 18	......	10 40	48 48	197 00
July 11, 1903	Ellery, from 40 ft. s of n of Forest to 222 ft. n of n of same	262	6 in.	105 99	....	8 86	10 79	...	28 73	5 75	18 50	4 00	....	....	40 03	222 65
June 23, 1903	Elmwood, from 6 ft. 5 in. s of n of Jefferson to 35 ft. n of s of Congress	560	12 in.	672 53	....	226 78	109 62	...	63 50	8 22	59 53	11 51	....	28 00	513 83	1,693 52
June 19, 1903	Finlay, from 436 ft. w of w of Jos. Campau to 487 ft. w of w of same	54	4 in.	12 74	....	36	1 25	...	....	....	....	1 25	....	....	16 54	32 14
Sept. 10, 1903	Frederick, from 1 ft. w of w of Collins to 35 ft. e of w of McDougall	479	6 in.	193 39	....	7 18	14 28	....	....	1 69	19 81	2 25	....	23 95	137 86	400 36
Sept. 18, 1902	Fremont, from 23 ft. e of w of Moran to 414 ft. e of e of same	444	6 in.	180 48	....	13 88	14 28	....	28 73	87	21 42	2 68	....	22 20	108 75	393 24
Sept. 23, 1902	Forest, from 8 in. main on Van Dyke to e line of Forest and Van Dyke	24	6 in.	9 69	....	7 66	2 91	....	....	44	....	1 75	....	....	27 00	49 45

May 6, 1903	**Front, from 84 ft. e of e of Third to 48 ft. e of w of Second street**	**270**	**6 in.**	**130 89**		**18 06**	**14 53**		**29 00**	**16 20**	**41 75**	**3 75**		**13 50**	**191 81**	**458 99**
Mar. 31, 1903	**Grandy, connecting 6 in. in Grandy with 36 in. in Mack**	**17½**	**6 in.**	**8 69**		**20 27**	**3 74**		**32 00**	**89**	**22 05**	**75**			**11 41**	**99 70**
Aug. 10, 1902	**Howell, from 15 ft. n of n of Buchanan to 13 ft. w of e of Howell**	**142**	**6 in.**	**57 08**			**4 86**			**72**		**1 44**		**7 20**	**39 97**	**111 27**
Sept. 13, 1902	**Harper, alleys between Brush and Beaubien**	**175**	**6 in.**	**70 66**		**18 49**	**4 20**			**2 33**		**1 75**		**8 75**	**97 50**	**208 68**
Dec. 12, 1902	Hurlbut, north of Kercheval	325	6 in.	130 05		20	10 38			3 94		4 75		16 25	128 25	298 82
Apr. 27, 1903	Harper, from 13 ft. e of w of Elmwood to 558 ft. w of same	571	8 in.	391 85		24 71	26 98		75 50	1 68	42 04	4 00		28 55	131 69	727 00
June 8, 1903	Howard, alley s of, from 28 ft. w of e of First to 4 ft. e of e of same	31	6 in.	15 25		8 75	3 74		14 50	1 41	22 97	1 50			49 65	117 77
May 4, 1903	Hale, from 25 ft. w of e of Chene to 4½ ft. w of w of same	43	6 in.	20 89		3 77	3 74		14 50	44	20 95	2 25			37 25	108 79
Oct. 23, 1902	Ingersoll, from 11 ft. e of w of Hammond to 24 ft. e of w of Wesson, also from 14 ft. w of e of Junction to 12 ft. e of w of Thirty-first street	403	6 in.	162 72		8 07	12 45		21 00	1 20	21 04	1 25		20 15	119 00	366 88
		573	6 in.	278 16			17 84		14 50	2 79	20 51	3 75		28 65	187 76	553 96
June 6, 1903	Jefferson, alley n of, from 4 ft. e of Beaubien to 4 ft. w of w of same	68	6 in.	32 94		8 45	6 23		29 00	5 78		1 75			78 97	168 12
May 26, 1903	Jefferson, from 8 ft. w of w of Adair to 329 ft. e of w of same	390	10 in.	346 94		17 47	35 24		14 50	19 11		13 68		19 50	378 80	845 19
May 26, 1903	Jefferson, from 8½ ft. w of w of Adair to 3½ ft. w of w of Elmwood	245	12 in.	292 34		24 00	35 24			18 62	21 00	4 25		12 25	361 20	768 90
Feb. 10, 1903	Kercheval, from 14 ft. w of e of Van Dyke to 600 ft. e of e of same	615	8 in.	353 18		15 36	24 90		39 73	2 45	20 20	4 75		30 75	140 25	631 57
Aug. 5, 1902	Lambert, from 41 ft. e of w of Van Dyke to e line of same	25	6 in.	10 10		6 43	2 08			40		1 25			19 82	40 08
Oct. 14, 1902	Larned, from 742 ft. e of e of Elmwood to 931 ft. e of e of same	189	6 in.	76 31		8 89	8 30		7 73	80		2 00		9 45	93 00	206 48
Mar. 31, 1903	Larned, from 4 ft. e of w of Leib to 240 ft. e of w of same	244	6 in.	98 18		77	8 30		21 00	1 53	20 58	3 00		12 20	71 25	236 81
Apr. 22, 1903	Lota, from 25 ft e of w of Wesson to 283 ft. w of w of same	308	6 in.	148 69		12 59	12 45		26 00	95	20 06	4 00		15 40	61 88	302 02
Apr. 23, 1903	Lawton, from 25 ft. n of s of Hudson to 186 ft. s of s of same	211	6 in.	102 18		18 61	8 30		26 00	1 85	19 47	2 50		10 55	59 38	248 84
May 5, 1903	Longfellow, from 2 ft. n of w of Woodward to 8 ft. w of e of Third street	1,722	6 in.	831 58		35 30	62 25		26 00	5 27	40 19	8 25		86 10	352 63	1,447 57
June 6, 1903	Larned, alley n of, from 3½ ft. e of e of Beaubien to ½ ft. w of w of same	64	6 in.	30 96		8 45	6 23		29 00	4 59	23 14	5 78			77 43	185 58
June 8, 1903	Lafayette, alley s of, from 29 ft. w of e of First to 12 ft. e of w of same	18	6 in.	8 69		3 04	1 87			63		1 25			23 37	38 85
Sept. 17, 1902	Medbury, alley s of Medbury and Beaubien street	24	4 in.	7 26		5 54	4 15		42 65	64		1 25			34 37	95 86

PIPE LAID FROM JULY 1st, 1902, TO JULY 1st, 1903—Continued.

Date.	LOCATION OF PIPE.	Feet.	Size.	COST OF CONSTRUCTION.												
				Pipe.	Advertising.	Specials.	Lead.	Gates.		Sundries.	Gate-wells.	Hauling.	Re-paving.	Sup. & Eng.	Labor.	Total Cost.
								No.	Cost.							
Oct. 15, 1902	McKinstry, from 23 ft. n of s of Toledo to n line of same	40	6 in.	$16 15	......	$1 05	$1 66	....	....	$ 26	....	$ 75	....	....	$26 51	$46 38
Oct. 17, 1902	Military, from 22½ ft. n of s of Toledo to n line of same	45	6 in.	18 17	......	6 42	2 95	....	....	30	....	75	....	....	24 42	53 01
Oct. 6, 1902	Maxwell, from 21 ft. s of n of Hendrie to 384 ft. s of s of same	420	6 in.	169 58	......	8 19	9 96	....	$28 73	1 25	$20 15	2 50	.. ..	$21 00	104 66	426 02
Feb. 24, 1902	Mt. Elliott, crossing the 36 in. main	10	8 in.	4 37	.....	16 35	3 74	....	....	12	....	1 25	....	....	7 41	33 24
Apr. 27, 1903	McClellan, from 32 ft. s of n of Chapin to 231 ft n of n of same	263	6 in.	127 49	......	6 82	9 34	....	....	82	....	2 75	....	13 15	56 44	216 81
Apr. 25, 1903	Maxwell, from 11 ft. s of n of Gratiot to 274 ft. n of n of same	285	6 in.	139 08	......	7 72	10 38	....	26 00	1 05	20 16	3 00	....	14 25	75 50	297 14
May 26, 1903	Mack, from w line of Collins to 26½ ft. e of w of Chene	1,957½	36 in.	10,644 45	......	1,070 10	724 59	....	1,347 00	232 40	835 56	268 91	....	97 88	8,647 25	23,868 14
Mar. 20, 1903	McDougall, connecting 4 in. with the 36 in. in Mack avenue	12′3″ 3′8″	8 in. 4 in.	9 58	.....	10 32	3 92	....	32 00	1 07	22 94	1 00	....	....	8 47	89 25
Feb. 25, 1903	Mack, from 36 in. main well to McDougall avenue for drain	45′ 2″	4 in.	13 75	......	4 66	1 96	....	....	....	....	1 00	....	....	10 41	31 76
Mar. 17, 1903	Mitchell, connecting 4 in. with the 36 in. in Mack avenue	7′8″ 2	8 in. 4 in.	6 10	......	10 32	3 74	....	32 00	1 16	24 64	75	....	....	11 35	90 06
Feb. 25, 1903	McDougall and Mack, from e of w of 36 in. gate on McDougall	43′8″ 8′4″	12 in. 8 in.	59 02	......	45 75	9 34	....	64 00	1 98	....	1 50	....	....	115 85	297 44
Apr. 27, 1903	Mack, connecting 6 in. in Chene with 30 in. in Mack	31	6 in.	15 25	......	11 18	3 74	....	....	20	....	1 50	....	....	35 69	67 56
Aug. 1, 1902	Otis, from 26 ft. 6 in. e of w of Wesson to 12 ft. e of w of Hammond	410½	6 in.	165 90	......	2 56	14 11	....	10 43	1 05	19 38	1 75	....	20 55	187 36	423 09
Oct. 8, 1902	Oakland, from 200 ft. n of n of Westminster to 358 ft. n of n of same	158	10 in.	117 52	......	....	6 23	....	....	95	....	1 50	....	7 90	89 88	223 98
Aug. 13, 1902	Palmer, from 315 ft. e of e line of Moran	120	6 in.	48 19	.....	1 89	4 23	....	....	18	....	1 25	....	6 00	50 69	112 43
Sept. 17, 1902	Palmer, crossing Beaubien to 2 ft. w of w of same	30	6 in.	6 05	......	....	2 08	....	21 00	1 37	23 16	50	....	....	33 62	87 78
Feb. 2, 1903	Pumping Station "Grounds"	253½	24 in.	673 30	......	203 15	82 17	....	412 41	66 91	205 01	5 00	....	12 70	1,123 45	2,784 00
Feb. 2, 1903	" " "	130	42 in.	962 44	......	61 43	93 88	....	....	142 11	....	89 00	....	6 50	1,010 73	2,365 59
Feb. 2, 1903	" " "	225	42 in.	1,653 00	.....	2,906 71	224 10	....	1,626 92	57 63	and Arches 893 06	116 00	....	11 25	2,101 02	9,589 69
Mar. 31, 1903	" " "	220	42 in.	1,535 55	......	3,589 34	287 60	....	1,619 19	37 79	905 31	40 75	....	11 00	2,124 95	10,151 48

Apr. 20, 1903	Pennsylvania, from 558 ft. s of s of Mack to 612 ft. s of s of same......	54	6 in.	96 08	....	....	9 08	....	....	38	....	75	.....	....	12 01	41 80
Apr. 25, 1903	Pumping Station "Grounds"........	202	42 in.	1,479 00	....	1,457 48	186 75	....	809 50	25 51	....	53 63	.....	10 10	1,996 28	6,018 25
Apr. 30, 1903	" " "	50	4 in.	14 95	.....	5 04	2 49	....	....	49	....	1 25	.....	....	12 50	36 65
Apr. 11, 1903	Philadelphia, from 36 ft. e of w of Russell to 26 ft. e of w of Cameron	674	6 in.	325 44	....	15 55	24 90	....	29 00	1 98	39 62	4 50	.....	33 70	128 44	608 08
May 6, 1903	Pleasant, n of Dry Dock.......	60	4 in.	17 92	....	....	1 66	....	....	21	....	1 25	.....	......	17 21	38 25
May 6, 1903	Pumping Station "Grounds"........	58	10 in.	53 38	....	59 62	18 68	....	57 15	8 10	448 85	5 00	.....	....	924 12	1,574 90
June 3, 1903	Peirce, from 5 ft. w of w of Chene to 4¾ ft. e of e of same	72'7"	6 in	85 08	....	10 60	7 47	....	29 00	1 98	41 20	1 50	.....	....	47 00	178 83
Aug. 11, 1902	Reeder, from 7 ft. w of e of Cavalry to 92 ft. 5 in. e of e of same........	98'8"	4 in.	25 14	....	....	2 74	...	....	23	....	1 25	.....	....	25 25	54 61
Aug. 20, 1902	Rogers, from 29 ft. 5 in. w of e of Cavalry to old pipe on Rogers 20 ft. 4 in. n of n of same................	289	6 in.	116 69	....	....	9 30	....	21 00	1 04	18 15	1 49	.....	14 45	63 07	245 19
Sept. 12, 1902	Rogers, from 27 ft. w of e of Campbell to 364 ft. e of e of same.......	373	4 in.	93 14	....	7 94	10 71	....	15 46	1 21	20 22	3 50	.....	18 65	65 80	236 63
July 12, 1902	Stanton, from 34 ft. 6 in. n of n of Milwaukee to 125 ft. s of s of same	160	6 in.	64 60	....	11 89	8 09	....	28 73	1 28	18 98	4 00	.....	8 00	39 05	184 62
Sept. 18, 1902	Sprague, from 8 in. main in Van Dyke to e line of same............	24	6 in.	9 69	....	2 70	2 01	....	....	1 25	....	1 75	.....	....	20 50	38 80
Oct. 10, 1902	St. Antoine, from 23 ft. n of n of Horton to 25 ft. n of n of Custer...	330	6 in.	133 24	....	12 78	14 53	....	28 73	1 43	40 60	1 81	.....	16 50	126 99	376 56
Oct. 20, 1902	Seyburn, from n line of Agnew to 14 ft. 6 in. n of n of Kercheval.....	1,368	6 in.	552 33	....	21 12	44 81	...	42 00	8 20	62 93	5 00	.....	68 40	409 28	1,214 02
Oct. 31, 1902	Superior, from 78 ft. s of s of Gratiot to 16 ft. w of e of Collins..........	2,023	36 in.	10,908 40	....	985 76	684 95	....	1,136 19	478 37	1,106 41	349 78	.....	101 15	10,824 58	26,025 54
Sept. 12, 1902	Superior, from 36 in. main to Moran street sewer..	14	6 in.	5 66	....	5 86	2 82	....	21 00	12	....	1 00	.....	......	29 14	65 60
Sept. 12, 1902	Superior and Moran, for drain from 36 in. gate well	19	4 in.	4 74	....	3 00	95	....	7 73	......	....	75	.....	....	9 25	26 42
Nov. 18, 1902	Sylvester, from 17 ft. e and w of McClellan to 23 ft. e of w of Pennsylvania....................	709	6 in.	285 05	.... ..	8 14	20 75	....	42 00	2 82	39 52	2 76	.....	35 30	212 24	648 58
Dec. 18, 1902	Sidney, from 23 ft. w of e of Russell to 394 ft. w of w of same	431	6 in.	174 42	....	8 10	13 07	....	28 73	2 00	20 78	5 25	.....	21 55	117 06	390 96
June 27, 1903	Scott, from 26 ft. w of e of Chene to 16 ft. w of w of same............	53	6 in.	26 69	....	9 02	3 74	....	14 50	48	....	1 00	.....	....	40 69	96 12
May 6, 1903	Thirteenth, from 24 ft. n of s of McGraw to 32 ft. s of n of Antoinette	495	6 in.	238 97	....	97	16 60	....	14 50	99	19 66	4 25	.....	24 75	97 13	417 82
Aug. 29, 1902	Thirtieth, from 36 ft s of n of Herbert to 293 ft. s of s of same.	257	6 in.	103 76	....	... .	6 97	....	....	39	....	1 25	.....	....	72 25	184 62
	Twenty-eighth, from 124 ft. n of n of Rich to 5 ft. n of s of Devereaux..	1,921	6 in.	775 61	....	18 94	57 10	....	42 00	4 14	37 63	50	.....	96 05	603 64	1,635 61
Oct. 3, 1902	Twenty-fifth, from 18 ft. 5 in. s of Warren to 21 ft. s of n of Hancock	504	6 in.	198 65	....	67	14 53	....	21	67	22 44	3 00	.....	25 10	154 51	440 47
Mar. 31, 1903	Thurman, from 9 ft. 5 in. s of n of Gratiot to 551 ft. n of n of same...	560	6 in.	226 95	....	14 57	17 64	..	28 73	2 29	20 91	4 75	.....	28 00	124 66	468 50

PIPE LAID FROM JULY 1st, 1802, TO JULY 1st, 1903—CONTINUED.

Date.	LOCATION OF PIPE.	Feet.	Size.	COST OF CONSTRUCTION.												
				Pipe.	Advertising.	Specials.	Lead.	Gates.		Sundries.	Gate-wells.	Hauling.	Repaving.	Sup. & Eng.	Labor.	Total Cost.
								No.	Cost.							
Mar. 6, 1902	Thirty-first, from 22 ft. s of n of Michigan to 3 ft. s of s of same....	50	6 in.	$ 24 40	....	$ 2 36	$ 3 32	....	$ 14 50	$ 61	$ 21 47	$ 1 50	.....	....	$ 46 33	$ 114 59
Mar. 10, 1902	Twenty-first, from 5 ft. s of s of Baker to 27 ft. n of n of same. .	32	6 in.	16 78	....	3 04	2 61	....	14 50	99	22 28	75	.....	.. ...	30 10	91 05
Mar. 28, 1902	Theodore, from 22 ft. e of n of Concord to 26 ft w of e of Bellevue...	378	6 in.	153 00	......	9 31	14 53	....	42 00	2 11	112 66	4 24	.....	$ 18 90	109 01	395 76
Mar 9, 1902	Thirty-first from 13½ ft. s of n of Ingersoll to 25 ft. n of s of same	20	6 in.	11 13	....	3 87	1 39	....	....	02	....	75	.....	....	6 51	23 67
Mar. 9, 1902	Twenty-first from 22 ft. s of n of Baker to 6 ft. n of n of same......	28	6 in.	13 57	....	11 18	4 13	....	14 50	1 18	....	1 50	.....	....	43 50	89 56
May 10, 1903	Theodore, from w line of Moran to 582 ft. w of w of same............	582	6 in.	280 91	....	5 36	19 50	...	14 50	2 08	20 26	3 80	.....	29 10	202 88	578 42
June 23, 1903	Thirty-fourth, from 345½ ft. s of s of Herbert to 664 ft. n of n of same	1,191½	6 in.	540 77	......	12 79	41 11	....	14 50	4 94	19 18	7 94	.....	55 98	282 20	979 41
Aug. 29, 1902	Van dyke and Warren.......... ...	22	6 in.	8 64	....	3 36	1 66	....	....	26	....	1 75	.....	....	23 25	38 92
Aug. 23, 1902	Van Dyke, from 8 in. main to e line of Stevens..	24	6 in.	9 69	....	2 70	1 66	...	....	26	....	1 75	.....	....	20 50	36 56
Oct. 4, 1902	Vulcan, from 22 ft. 6 in. e of w of St. Aubin to 20 ft. w of e of Fordyce, also in Fordyce from 8 ft. 2 in. n of n of Vulcan....................	318 318	6 in. 6 in.	256 79	....	16 42	18 68	...	28 73	2 06	20 87	3 55	... .	31 80	152 15	531 05
Dec. 19, 1902	Walbridge, from 25 ft. w of e of Van Dyke to 590 ft. e of e of same	615	6 in.	248 63	....	13 67	20 75	....	28 78	4 56	20 80	5 80	.....	30 75	206 13	579 82
Mar. 24, 1903	Warren, from 10 ft. e of w line to 75 ft. e of w of same................	85	4 in.	21 68	......	1 27	8 32	....	7 78	2 46	....	1 50	.....	1 50	20 69	60 15
Mar. 6, 1903	Washington, alley e of, and n of Clifford	195	8 in.	133 82	....	75 98	16 81	....	....	13 60	40 71	4 75	.....	9 75	330 54	625 96
June 3, 1903	Watson, from 26½ ft. w of e of Chene street to 5 ft. w of same.....	43½	6 in.	22 88	. ....	5 74	3 92	...	14 50	1 13	5 37	1 00	.....	....	45 31	99 85

TOTAL PIPE LAID IN CITY OF DETROIT AND VILLAGES OF WOODMERE, HAMTRAMCK, DELRAY AND RIVER ROUGE

LOCATION OF PIPE.	Feet.	Size.	COST OF CONSTRUCTION									
			Pipe.	Specials.	Lead.	Gates. Cost.	Sundries	Gatewell	Hauling.	Sup. & Eng.	Labor.	Total Cost.
City of Detroit........................	952.4	4 in.	....	....	....	....	....	....	....	....	....	$120,477 80
	28,459.11	6 in.										
	1,521	8 in.										
	991	10 in.										
	848.8	12 in.										
	253.6	24 in.										
	53	30 in.										
	3,980.6	36 in.										
	777	42 in.										
	37,838.4											
Village of Woodmere.................	34,563.2	4 in.	$ 45,380 52	$1,676 41	$4,027 82	$ 3,222 80	$ 559 70	$3,736 35	$1,456 76	$5,240 35	$ 24,010 61	89,311 32
	49,086.11	6 in.										
	9,980	8 in.										
	5,213.10	10 in.										
	7,578.6	12 in.										
	473	16 in.										
	106,896.3											
Village of Hamtramck................	7,442	6 in.	16,884 64	636 71	1,488 81	1,522 20	296 35	1,781 66	443 27	2,020 77	15,008 28	40,082 69
	25,853	6 in.										
	4,963.6	8 in.										
	2,393.6	10 in.										
Village of Delray......................	1,583	4 in.	878 70	25 14	66 90	57 73	8 24	58 10	14 80	129 15	769 86	2,008 62
	1,000	6 in.										
	2,583											
Village of River Rouge...........	1,395	6 in.	563 68	17 83	46 69	42 00	9 16	45 32	10 25	69 75	363 03	1,167 71

Total feet of pipe laid.........189,364 feet 10 in. or $35\frac{4565}{5280}$ miles.

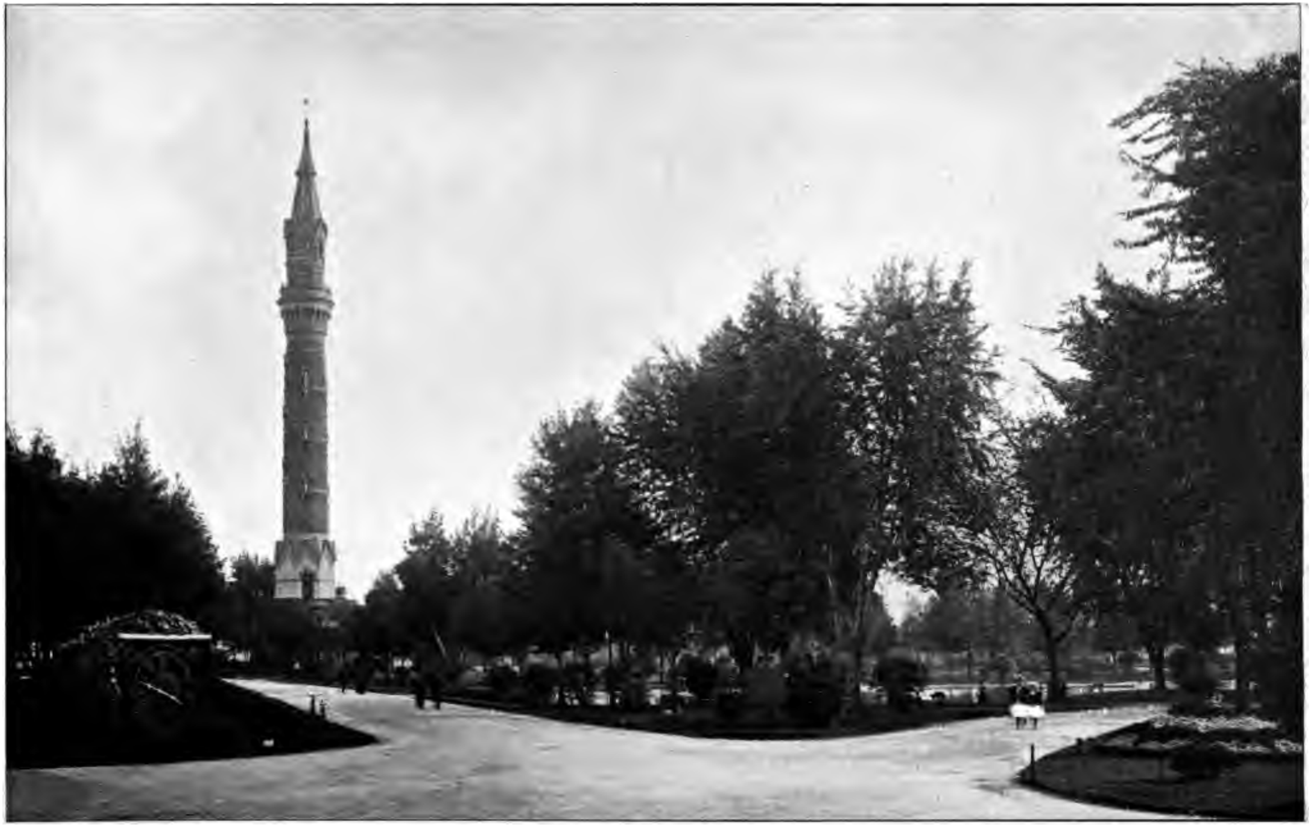
Total cost, $253,048 14

PIPE LOWERED FROM JULY 1st, 1902, TO JULY 1st, 1903.

LOCATION OF PIPE.	Feet	Size.	Cost.
Belvidere, North of Jefferson	336	6 in.	$ 261 02
Baldwin, North of Warren	565	10 in.	434 74
Van Dyke, Forest to Mack	2602	8 in.	1,806 85
	3503		$2,502 61

All of which is respectfully submitted.

JOHN DELANEY,
Superintendent of Construction.



PUMPING STATION PARK, LOOKING TOWARDS TOWER.

SUPPLEMENT.

BOARD OF MANAGEMENT OF DETROIT WATER WORKS.

Board of Trustees appointed by Common Council, February 24th, 1852; organized March 1st, 1852.

Shubael Conant, Chairman.
Henry Ledyard.
Edmund A. Brush.
Wm. R. Noyes.
Jas. A. Van Dyke.

1853.

On the 16th of May, 1853, the Board of Water Commissioners of the City of Detroit was organized under an act previously approved by the Common Council and passed by the Legislature, February 14th, 1853. The term of service was determined by lot, as follows:

Jas. A. Van Dyke,	for 3 years.
Edmund A. Brush,	for 4 years.
Henry Ledyard,	for 5 years.
Shubael Conant,	for 6 years.
Wm. R. Noyes,	for 7 years.

Shubael Conant was elected President, who, finding the duties too arduous, resigned July 30th, and Edmund A. Brush was elected.

1854.

Edmund A. Brush, President.
Shubael Conant.
Jas. A. Van Dyke.
Wm. R. Noyes.
Henry Ledyard.

1855.

Edmund A. Brush, President.
Henry Ledyard.
Shubael Conant.
William R. Noyes.
James A. Van Dyke, died May 8th.
A. D. Fraser, appointed to fill vacancy.

1856.

Edmund A. Brush, President.
Shubael Conant.
Wm. R. Noyes.
Alexander D. Fraser, re-appointed May 1st, for 5 years.
Henry Ledyard.

1857.

Edmund A. Brush, President, re-appointed May 1st, for 5 years.
Henry Ledyard.
Alexander D. Fraser.
William R. Noyes.
Shubael Conant.

1858.

Edmund A. Brush, President.
Shubael Conant.
Alexander D. Fraser.
Henry Ledyard, re-appointed May 1st, for 5 years.
Wm. R. Noyes.

1859.

Edmund A. Brush, President.
Alexander D. Fraser.
Wm. R. Noyes.
Shubael Conant, term expired May 1st, and
Julius D. Morton, appointed for 5 years.
Henry Ledyard, vacated by moval from city, and
John V. Ruehle, appointed May 1st to fill vacancy.

1860.

Edmund A. Brush, President.
Alexander D. Fraser.
Julius D. Morton.
William R. Noyes, re-appointed May 1st, for 5 years.
John V. Ruehle.

1861.

Edmund A. Brush, President.
Alexander D. Fraser, re-appointed May 1st for 5 years.
Jno. V. Ruehle, resigned Sept. 16th, and
Chauncey Hurlbut appointed to fill vacancy.

1862.

Edmund A. Brush, President, re-appointed May 1st, for 5 years.
Wm. R. Noyes.
Julius D. Morton.
Chauncey Hurlbut.
Alexander D. Frazer.

1863.

Edmund A. Brush, President.
Alexander D. Frazer.
Wm. R. Noyes.
Julius D. Morton.
Chauncey Hurlbut, term expired May 1st, and
Stanley G. Wight, appointed for 5 years.

1864.

Edmund A. Brush, President.
Alexander D. Frazer.
Wm. R. Noyes.
Julius D. Morton, term expired May 1st.
Stanley G. Wight.

1865.

Edmund A. Brush, President.
Wm. R. Noyes, resigned Jan. 10, and Jacob S. Farrand appointed to fill vacancy, Term expired May 1st. Re-appointed for 5 years.
Alexander D. Frazer.
Stanley G. Wight.
Julius D. Morton, re-appointed for 5 years from May 1st, 1864. Died Feb. 1865, and
Jno. Owen appointed to fill vacancy.

1866.

Edmund A. Brush, President.
Alexander D. Fraser, re-appointed May 1, for 5 years.
Stanley G. Wight.
Jacob S. Farrand.
Jno. Owen.

1867.

Edmund A. Brush, President, re-appointed May 1, for 5 years.
Alexander D. Fraser.
Jacob S. Farrand.
Jno. Owen.
Stanley G. Wight.

1868.

*Edmund A. Brush, President.
Stanley G. Wight, term expired May 1, and
Chauncey Hurlbut appointed for 5 years.
Jacob S. Farrand.
John Owen.
Caleb Van Husan.

*Edmund A. Brush resigned January 28, and Caleb Van Husan appointed to fill vacancy, and Alexander D. Fraser elected President.

1869.

Alexander D. Fraser, President.
John Owen, re-appointed May 1, for 5 years.
Jacob S. Farrand.
Caleb Van Husan.
Chauncey Hurlbut.

1870.

Alex. D. Fraser, President.
Jacob S. Farrand, re-appointed May 1, for 5 years.
Jno. Owen.
Caleb Van Husan.
Chauncey Hurlbut.

1871.

*Alex. D. Fraser, President.
Jacob S. Farrand.
Caleb Van Husan.
Chauncey Hurlbut.
John Owen.

*Term expired May 1, and Samuel F. Hodge appointed for 5 years. Jacob S. Farrand elected President.

1872.

Jacob S. Farrand, President.
Jno. Owen.
*Caleb Van Husan.
Samuel F. Hodge.
Chauncey Hurlbut.

*Term expired May 1st, and Elija Smith appointed for 5 years.

1873.

*Chauncey Hurlbut, President. Jacob S. Farrand.
Jno. Owen. Samuel F. Hodge.
Elija Smith.

*Term expired and re-appointed. Elected President, May, 1872.

1874.

Chauncey Hurlbut, President. Jacob S. Farrand.
*Jno. Owen. Samuel F. Hodge.
Elija Smith.

*Term expired and re-appointed.

1875.

Chauncey Hurlbut, President. *Jacob S. Farrand.
Jno. Owen. Samuel F. Hodge.
Elija Smith.

*Term expired and re-appointed.

1876.

Chauncey Hurlbut, President. Jacob S. Farrand.
Jno. Owen. *Samuel F. Hodge.
Elija Smith.

*Term expired and re-appointed.

1877.

Chauncey Hurlbut, President. Jacob S. Farrand.
Jno. Owen. Samuel F. Hodge.
*Michael Martz.

*Elija Smith's term expired and Michael Martz appointed to fill vacancy.

1878.

*Chauncey Hurlbut, President. Jacob S. Farrand.
Jno. Owen. Samuel F. Hodge.
Michael Martz.

*Term expired and re-appointed.

1879.

Chauncey Hurlbut, President.	Jacob S. Farrand.
Michael Martz.	*Jas. Beatty.
*Jno. Pridgeon.	

*Jno. Owen's term expired and John Pridgeon appointed to fill vacancy. Samuel F. Hodge resigned and Jas. Beatty appointed to fill vacancy.

1880.

Chauncey Hurlbut, President.	*Jacob S. Farrand.
Michael Martz.	Jas. Beatty.
Jno. Pridgeon.	

*Term expired and re-appointed.

1881.

Chauncey Hurlbut, President.	Jacob S. Farrand.
Michael Martz.	*Jas. Beatty.
Jno. Pridgeon.	

*Term expired and re-appointed.

1882.

Chauncey Hurlbut, President.	Jacob S. Farrand.
*Michael Martz.	Jas. Beatty.
Jno. Pridgeon.	

*Term expired and re-appointed.

1883.

*Chauncey Hurlbut, President.	Jacob S. Farrand.
Michael Martz.	Jas. Beatty.
Jno. Pridgeon.	

*Term expired and re-appointed.

1884.

Chauncey Hurlbut, President.	Jacob S. Farrand.
Michael Martz.	Jas. Beatty.
*Jno. Pridgeon.	

*Term expired, and Marshall H. Godfrey appointed

1885.

*Jacob S. Farrand, President. Michael Martz.
Marshall H. Godfrey. *Edwin F. Conely.
*Samuel G. Caskey.

*Jas. Beatty died and Edwin F. Conely appointed to fill vacancy.
*Chauncey Hurlbut died and Samuel G. Caskey appointed to fill vacancy.
*Jacob S. Farrand's term expired and re-appointed.

1886.

Jacob S. Farrand, President. Michael Martz.
Marshall H. Godfrey. *Jno. Pridgeon.
Samuel G. Caskey.

*Edwin F. Conely's term expired and Jno. Pridgeon appointed to fill vacancy.

1887.

Jacob S. Farrand, President. Jno. Pridgeon.
Marshall H. Godfrey. Samuel G. Caskey.
*Joseph Nagel.

*Michael Martz term expired and Joseph Nagel appointed to fill vacancy.

1888.

Jacob S. Farrand, President. Jno. Pridgeon.
Marshall H. Godfrey. *Samuel G. Caskey.
Joseph Nagel.

*Term expired and re-appointed.

1889.

Jacob S. Farrand, President. Jno. Pridgeon.
Samuel G. Caskey. Jos. Nagel.
*August Goebel.

*Marshall H. Godfrey resigned January 1, 1889. August Goebel appointed to fill vacancy. Term expired May 1st, and re-appointed.

1890.

Jno. Pridgeon, President.
August Goebel.
Joseph Nagel.
*Henry M. Duffield.
Samuel G. Caskey.

*Jacob S. Farrand's term expired, and Col. Duffield was appointed to fill vacancy July 9th, 1890; John Pridgeon resigned as President of the Board, on account of ill-health, and Henry M. Duffield was elected to fill vacancy.

1891.

Henry M. Duffield, President.
*Jno. Pridgeon.
August Goebel.
Samuel G. Caskey.
Joseph L. Hudson.

*John Pridgeon's term expired May 1st, and Frank E. Kirby was appointed for a term of 5 years.

1892.

Samuel G. Caskey, President.
Henry M. Duffield.
August Goebel.
Joseph L. Hudson.
Frank E. Kirby.

1893.

August Goebel, President.
Samuel G. Caskey.
Frank E. Kirby.
Henry M. Duffield.
Joseph L. Hudson.

1894.

Henry M. Duffield, President.
Frank E. Kirby.
Albert L. Stephens.
De Witt H. Moreland.
Edward W. Pendleton.

A. L. Stephens appointed to succeed J. L. Hudson.
D. W. H. Moreland appointed to succeed S. G. Caskey.
Clarence A. Black appointed to succeed August Goebel.
C. A. Black resigned and E. W. Pendleton appointed to succeed him from Dec, 1.

1895.

Frank E. Kirby, President.
Albert L. Stephens.
DeWitt H. Moreland.
Edward W. Pendleton.
Darius D. Thorp.

1896.

Albert L. Stephens, President. John P. Huckestein.
Edward W. Pendleton. Darius D. Thorp.
John W. McGrath.

D. W. H. Moreland resigned to accept Commissionership on Board of Public Works, and J. P. Huckestein was appointed to fill vacancy.

Frank E. Kirby's term expired and J. W. McGrath was appointed to succeed him.

1897.

Edward W. Pendleton, President. James W. Millen.
John W. McGrath.
Darius D. Thorp. August Goebel.

August Goebel, appointed to succeed A. L. Stephens. Resigned January 1, 1898, and Joseph J. Noeker was appointed to fill vacancy.

John P. Huckestein resigned and James W. Millen was appointed to fill vacancy.

1898.

Edward W. Pendleton, President. John W. McGrath.
Darius D. Thorp.
Joseph J. Noeker. James Meathe.

1899.

Darius D. Thorp, President. Joseph J. Noeker.
John W. McGrath. *James Meathe.
Edward W. Pendleton.

*James Meathe died September 21st, 1899, and Benjamin Guiney was appointed to fill vacancy.

1900.

John W. McGrath, President. *Benjamin Guiney.
Joseph J. Noeker. Edward W. Pendleton.
Darius D. Thorp.

Benjamin Guiney resigned, and John Zynda was appointed to fill vacancy.

1901.

Joseph J. Noeker, President. Edward W. Pendleton.
John Zynda. Darius D. Thorp.
Joseph J. Crowley.

1902.

John Zynda, President.
Edward W. Pendleton.
Darius D. Thorp.
Joseph J. Crowley.
John Schroeder.

1903.

Edward W. Pendleton, President.
Darius D. Thorp.
Joseph J. Crowley.
John Schroeder.
John Zynda.

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FIFTY-SECOND
ANNUAL REPORT
OF THE
BOARD OF WATER COMMISSIONERS

WATER WORKS 1874.

TO THE

COMMON COUNCIL OF THE CITY OF DETROIT

FOR YEAR
ENDING JUNE 30TH
1904.

CALVERT LITH.CO. DETROIT

CONTENTS.

PAGE.
Report of the Commissioners 5
Financial Report of the Secretary 8
Report of the General Manager 26
Report of the Civil Engineer 33
Report of Superintendent of Meters and Inspection 48
Report of the Chief Engineer at Pumping Works 55
Report of the Superintendent of Construction 60
Supplement 75

DARIUS D. THORP
PRESIDENT

EDWARD W. PENDLETON

JOSEPH J. CROWLEY
VICE-PRESIDENT

JOHN SCHROEDER

JOHN ZYNDA

BENJAMIN F. GUINEY
SECRETARY

THOMAS R. PUTNAM
SUP'T METERS AND INSPECTION

CLARENCE W. HUBBELL
CIVIL ENGINEER

HARRY S. STARKEY
GENERAL MANAGER

URIAH GOULD
CHIEF ENGINEER PUMPING STATION

JOHN DELANY
SUP'T OF CONSTRUCTION

Engin. lib.
Gift
Benj. Neal
1-27-32

BOARD OF WATER COMMISSIONERS

OF THE

CITY OF DETROIT.

MEMBERS:

DARIUS D. THORP, 1905.
JOHN SCHROEDER, 1907.
JOSEPH J. CROWLEY, 1906.
JOHN ZYNDA, 1908.
EDWARD W. PENDLETON, 1909.

COMMITTEES:

Ways and Means	Commissioners PENDLETON, SCHROEDER.
Extension and Construction,	Commissioners CROWLEY, ZYNDA.
Pumping Works	Commissioners SCHROEDER, CROWLEY.
Supplies	Commissioners ZYNDA, PENDLETON.

The President is ex-officio member of each committee.

OFFICERS:

President	DARIUS D. THORP.
Vice-President	JOSEPH J. CROWLEY.
General Manager	H. S. STARKEY.
Secretary	BENJ. F. GUINEY.
Superintendent of Construction	JOHN DELANY.
Supt. of Meters and Inspection	THOMAS R. PUTNAM.
Civil Engineer	CLARENCE W. HUBBELL.
Chief Engineer at Pumping Works	URIAH GOULD.
Bookkeeper	W. W. WILCOX.
Receiving Clerk	GEORGE E. KUNZE.
Cashiers	S. G. ROOD. CHARLES W. KEENA.
Meter Clerks	GERALD P. MONAGHAN. CHAS. F. GILMER.
Permit Clerk	WM. L. WALLACE.
Collectors	FRANK PETZ. ALBERT L. STADLER. ANTHONY VOGEL. ANTHONY J. LOOK. WM. COSGROVE. JOHN J. ROBINSON. M. A. DETTLING. THOMAS J. CLANCY. JOHN C. BECKER.
Supt. Storage Grounds	JOHN REHE.

THE BOARD OF WATER COMMISSIONERS

OF THE

CITY OF DETROIT.

RATES JULY 1, 1904.

METER RATES.

Payable Quarterly.

	QUARTERLY
First 30,000 gals	$1 75
All in excess of 30,000 gals	2¼ cts. per M.
Minimum Rate	1 75

ASSESSMENT RATES.

	PER ANNUM
For Family, household purposes	$2 60
Additional Families to first, in same house supplied through same faucet, each family	1 40
Green Houses.—Special rates.	
Private Stable, for each horse	1 20
Livery Stables, " " "	1 20
Dray and Team Horses, each	60
Cows, each	60
Stores and Offices, from	$1 00 to 12 00
Bakeries, average daily use for each barrel of flour	2 00
Groceries and Provision Stores, from	$3 00 to 50 00
Saloons, from	6 00 to 50 00
Bar, with faucet, from	8 00 to 50 00
Fish Houses, from	6 00 to 50 00
Beer Pump	2 00
Barber Shops, each chair	2 00
Slaughter Houses.—Special rates.	
Hotels and Taverns, in addition to family rate, each room	60
Boarding Schools, from	$4 00 to 50 00
Printing Offices.—Special rates.	
Butcher Stalls, each not less than	3 00
Workshops, for 10 persons or under	3 00
" for each additional 10 persons	1 00
Boarding Houses, in addition to family rate, each boarder or roomer,	40
Estimated quantities of water each 1,000 gallons	07
Building Purposes, each 1 M brick	03
" " " 100 yards plastering	05
" " " perch stone	01
" " minimum	50

FIXTURES.

Bath Tub, for families, 1st tub	$1 00
" " each additional tub	60
" " public, each tub	4 00
Automatic Water Closets, for family, 1st closet	1 60
" " " each additional	60
" " " for hotels, stores, factories, etc., for 10 persons	2 00
" " " each additional person	20
Rod Water Closets, not less than	6 00
Urinals, not less than	2 00
Wash Hand Basins, for family, each	50
" " " for other purposes, each person	15
Hose Bibb or Connection, premises 30 feet front or less	60
" " " " 30 feet to 60 feet	80
" " " " 60 feet to 100 feet	1 60
Special Rates for larger grounds.	
Fountains	$5 00 to 20 00
Street Sprinklers, each wagon	50 00

Where there is a waste of water an increase of rates will be made.

ANNUAL REPORT

OF THE

BOARD OF WATER COMMISSIONERS

OF THE

CITY OF DETROIT.

To the Honorable the Common Council:

GENTLEMEN—The Board of Water Commissioners of the City of Detroit respectfully submits herewith its report for the fiscal year ending June 30th, 1904.

The financial transactions, work of construction and maintenance, and the details of pumping water are fully set forth in the reports of the various officers of the Board, herewith submitted, and to which you are respectfully referred.

The total receipts for the year amounted to the sum of $945,738.61, of which the sum of $350,000 was received from bond issues, authorized by your honorable body and the Board of Estimates, $30,000 from the village of Ecorse, $6,755.90 from the village of Hamtramck, $5.662.33 from the village of Woodmere and $1,111.55 from the village of Delray.

The amounts received from the villages were for the cost of pipe extensions therein.

The total expenditures for the year was the sum of $745,161.93. Of this amount the sum of $409,735.54 was expended for construction, $159,397.91 for operation and maintenance, $90,000 for redemption of bonds, $57,329 for interest, and $3,699.48 under the Hurlbut will.

The total number of families supplied with water as shown on the assessment rolls July 1, 1904, was 70,087, an increase from July 1, 1903, of 2,708 families. There are but 93 families within the corporate limits unsupplied.

Since the last report the two high-pressure Allis-Chambers engines have been placed in commission, starting their year of probation trial January 18th, 1904. Duty test will be made in the near future.

The amount of water pumped during the year was 21,734,954,234 gallons, an average of 59,385,121 gallons per day, with a daily per capita (city) of 183 gallons. This pumpage is the largest in the history of the works.

The 36 and 42-inch mains, heretofore reported to your honorable body, extending from the pumping station on Hurlbut, Sylvester, Mt. Elliott, Mack to Collins, have been completed. A new 42-inch main, to extend through Congress, River, Stanton and Fort streets, between Sixth and Vinewood, to increase the supply on account of the rapid development of the manufacturing interests through that section, was begun early in the spring and has been pushed as rapidly as possible. Fifteen hundred and eighty feet of 16-inch pipe, to increase the supply for this line, has been laid in River street from Second to Sixth street.

Much attention has been given to increased fire protection for the factory districts of the city, many lines of 8 and 12-inch pipe having been laid during the year to increase the supply in localities where such protection, under the advice of the fire commission, seemed imperative. The Board will continue, as it has in the past, to give this matter the careful consideration its importance demands, in harmony with the recommendations of the fire department.

The matter of payment for water furnished to the public schools has been passed upon by the Supreme Court and the Board of Education has been held liable for the water it consumes.

The most important work of the Board at present is the construction of the river tunnel and intake crib and crib house, details of which have been submitted to you. This tunnel is of 10 feet diameter, built of vitrified brick, and will extend a distance of 3,160 feet under the river from shore shaft at south end of the pumping station to the head of Belle Isle. It will not only furnish a sufficient supply to meet the requirements of the city for many years to come, but the purest quality of water will also be assured. This work is in the hands of responsible and competent contractors and is progressing favorably.

The 10-foot shore tunnel, 1,032 feet in length, to connect with river tunnel, has been completed.

All of which is respectfully submitted.

DARIUS D. THORP,
JOSEPH J. CROWLEY,
JOHN SCHROEDER,
JOHN ZYNDA.
EDWARD W. PENDLETON.

REPORT OF THE SECRETARY.

Detroit, Mich., July 1, 1904.

To the Board of Water Commissioners of the City of Detroit:

GENTLEMEN—I have the honor to submit the Secretary's report for the year ending June 30th, 1904.

The estimated population of the City of Detroit at the present time according to the records of this office is 353,238, an increase of 13,648 since June 30th, 1903.

The following is a detailed statement of the receipts and disbursements:

Receipts.

Water rates assessed	$277,126 46	
Water rates metered	155,266 06	$432,392 52
Percentage		5,754 13
Shutting off and letting on		182 50
Plumbers' license account		415 00
Service cocks, permits	6,134 75	
Service cocks, material and labor	1,026 33	7,161 08
City of Detroit, general tax levy		75,000 00
Real estate revenue and expense		1,743 31
Meter account, material and labor		309 31
Meter repairs, material and labor		81 65
Iron pipe, material and labor	15,063 85	
Iron pipe, bonuses	3,176 79	18,240 64
Village of Hamtramck		6,755 90
Village of Delray		1,111 55
Village of Ecorse		30,000 00
Village of Woodmere		5,662 33
Pumping water		118 51
Pumping works		211 75

Repairing leaks		$ 23 79
Interest Account, interest on Gen. Account		2,016 81
Interest Account, Sinking Fund		4,365 15
Hurlbut Fund, from trustees	4,000 00	
Hurlbut Fund, interest on daily bal	15 47	4,015 47
Bonded indebtedness		350,000 00
Service extensions		69 71
Engineering		107 50
Total receipts		$945,738 61

Disbursements.

OPERATION AND MAINTENANCE.

Office Account—		
Manager, secretary and clerks	$ 24,171 48	
Watchmen and janitors	2,011 50	
General work and carpenter	1,442 25	
Scrubbing	162 00	
Books, Printing and stationery	1,770 38	
Printing annual reports	318 55	
Telephones	241 26	
Advertising and subscriptions	306 36	
Postage and stamped envelopes	255 00	
Towel supply	84 50	
Premium on guarantee bond	92 50	
Court fees	7 00	
Street car tickets	15 00	
Rubber stamps	8 85	
Disinfectant	13 00	
Ice	86 20	
Gas	6 98	
Horse care	180 00	
Horse shoeing	23 50	
Expert accountant	120 00	
Miscellaneous	527 58	
		$ 31,843 89
Service Connections and Leaks Account—		
Superintendent and labor	$ 15,737 08	
Service cocks, sleeves and valves	1,784 95	
Tools and repairs	61 06	
Stationery and printing	18 25	
Car fare	200 00	
Telephone	30 00	

Oil	$12 90	
Freight and express charges	45	
Lead pipe	41 51	
Rubber boots and repairs	30 87	
Paving repairs	579 63	
Teaming	25 50	
Miscellaneous	75 45	
		$ 18,597 65
Pumping Water Account—		
Engineers, firemen, etc	$ 31,716 00	
Coal	34,612 13	
Unloading coal	3,358 24	
Boiler and engine supplies	274 12	
Repairs to boilers and engines	829 23	
Engine oil	412 18	
Kerosene and gasoline	22 75	
Waste, packing and rags	696 46	
Boiler inspection	36 00	
Electric light fixtures and repairs	117 18	
Hose and couplings	32 97	
Tools	117 29	
Paint and glass	22 66	
Printing and stationery	32 70	
Telephone	66 00	
Hospital and doctors' services	160 00	
Freight and express	4 29	
Ice	40 00	
Horse shoeing	13 75	
Feed and bedding	43 17	
Repairs to coal unloading apparatus	94 02	
Miscellaneous	134 84	
		$ 72,835 98
Repairing Leaks Account—		
Superintendent, clerks, watchmen and labor	$ 4,270 13	
Pavement and repairs	566 70	
Tools and repairs	91 92	
Hose and pump repairs	89 48	
Horse care	165 00	
Car fare	10 00	
Lumber and paving blocks	98 44	
Telephone	36 00	
Rubber boots and repairs	33 62	
Printing and stationery	93 00	
Paint, glass, etc	10 08	
Brass and wood plugs	23 84	
Teaming	54 50	
Miscellaneous	103 42	
		$ 5,646 13

Meter Repairs and Expense Account—		
Labor	$ 1,071 50	
Fittings	790 68	
Express charges	1 00	
		$ 1,863 18
Percentage Account—		
Labor	$ 6,524 24	
		$ 6,524 24
Inspection Account —		
Superintendent, inspectors and clerks	$ 7,524 19	
Street car tickets	195 00	
Electric lamps	11 80	
Express charges	3 09	
Printing	49 00	
Miscellaneous	5 00	
		$ 7,788 08
Wagon and Harness Account—		
Harness and repairs	$ 339 81	
Wagon repairs	463 93	
Lumber	32 45	
New buggy	125 00	
Miscellaneous	12 39	
		$ 973 58
Office Furniture and Fixtures Account—		
Furniture and repairs	$ 24 89	
Electric fixtures	57 23	
Fire and Still Alarm	155 00	
Office fixtures	49 70	
Boiler inspection	1 50	
		$ 288 32
Real Estate, Revenue and Expense Account—		
Barn roof and new fence	$ 350 26	
Closet repairs	31 15	
Sidewalks	324 09	
Furnace repairs	357 50	
Paint, oil and glass	114 41	
Lumber	84 73	
Nails, hardware, etc	35 45	
Siding repairs	66 20	
Insurance premium	353 80	
Coal	629 55	
Office roof repairs	51 80	
Painting office	180 00	
		$ 2,578 94
Horse Expense Account, Service Connections—		
Oats, hay, etc	$ 735 02	
Shoeing	125 05	

Bedding	$ 26 75	
Veterinary services and drugs	19 03	
Barn tools	4 00	
		$ 909 85

Horse Expense Account, Repairing Leaks—

Oats hay etc	$ 582 77	
Shoeing	110 06	
Bedding	25 75	
Veterinary service and drugs	12 61	
Barn tools	4 00	
		$ 735 19

Pumping Works Grounds Account—

Superintendent and labor, grounds	$ 7,481 39	
Tools and fittings	121 50	
Paint, oil, etc	148 01	
Ice	58 13	
Horse shoeing	10 00	
Lumber	82 00	
Sidewalk, grounds and iron fence	720 28	
Closet repairs, library	68 07	
Miscellaneous	117 00	
		$ 8,806 38

Plumbers' License Account—

Printing	$ 6 50	
		$ 6 50

CONSTRUCTION.

Iron Pipe Account—

Superintendent and clerks	$ 10,383 50	
Foremen	2,267 30	
Watchmen, teamsters, plumbers, bricklayers and barnmen	11,697 45	
Labor	68,520 88	
Iron pipe	125,529 96	
Special castings	18,543 48	
Gates, valves and hydrants	6,029 68	
Pig lead	6,040 02	
Lead pipe, tin and solder	312 91	
Cement, stone, brick, sand, sewer crock	3,173 19	
Lumber	1,177 98	
Coal and coke	598 41	
Oil and gasoline	175 40	
Tools	335 27	
Repairing tools	168 69	

Cartage	$ 995 10	
Iron, nails, globes, fittings, etc.	374 73	
Channel iron rails and beams	132 27	
Hose and couplings	273 00	
Rubber boots and repairs	76 61	
Rope, packing and waste	67 37	
Paint, lead and oil	109 96	
Car fare	186 20	
Printing and stationery	252 48	
Telephone	313 24	
Pavement and inspector, Dept. of Public Works	2,063 28	
Wood rollers and plugs	32 91	
Freight and express	5 04	
Court fees	4 00	
Pump repairs	160 78	
Doctor's services	2 00	
Bicycle repairs	12 30	
Cart for hauling pipe	75 00	
Refund bonus	114 81	
Refund to Village of River Rouge	1,290 14	
Miscellaneous	182 49	
		$261,677 83

Iron Pipe, Horse Expense Construction Account—

Oats, hay, etc.	$ 1,046 68	
Shoeing	236 97	
Bedding	52 50	
Veterinary services and drugs	27 27	
Barn tools	8 71	
Horse purchases	810 00	
		$ 2,182 13

Meter Account—

Superintendent and labor	$ 5,093 01	
Meters	4,401 82	
Special castings and fittings	131 31	
Lumber	118 44	
Rags and packing	9 99	
Tools	12 64	
Nails, etc.	52 44	
Oil and gasoline	4 65	
Telephone	51 00	
Printing and stationery	23 65	
Freight and express charges	59	
Bicycle and repairs	68 75	
Paint, oil, etc.	95	
Horse board	180 00	

Horse shoeing	$ 59 00	
Harness and repairs	25 55	
Horse purchase	140 00	
Miscellaneous	6 38	
		$ 10,380 17
Engineering Account—		
Civil engineer and assistants	$ 13,140 23	
Instruments	251 60	
Tracing cloth and paper	183 63	
Books, maps and stationery	155 10	
Street car tickets	150 00	
Stamps	10 00	
Freight and express charges	6 43	
Telephone	79 27	
Gauges, fittings, etc	88 83	
Lumber	35 50	
Furniture	93 80	
Subscriptions	20 59	
Electric power and fixtures	16 98	
Tools	60 42	
Paint, etc.	5 88	
Ecorse survey expense	10 55	
Miscellaneous	47 76	
		$ 14,356 57
Pumping Works Account—		
Superintendent, foremen and labor	$ 28,355 09	
Allis-Chalmers engine contract	15,000 00	
Building contract and extras	13,686 94	
Special castings	2,168 72	
Cement, sand, crock and stone	4,568 65	
Brick	2,614 32	
Lumber	1,075 78	
Iron rails and beams	100 65	
Tools and repairs	93 35	
Iron, nails, bolts and nuts, etc	259 07	
Pipe fittings, etc., boiler and pump	472 82	
Closets, baths, etc	768 03	
Telephone	60 00	
Car tickets	60 00	
Paint, oil and glass	392 47	
Kerosene, gasoline and engine oil	230 91	
Rope and packing	91 82	
Hose and couplings	147 91	
Wiring electric fixtures	201 93	
Horse shoeing	21 00	
Hay and bedding	58 17	

Divers' services	$ 2,620 00	
Strainer intake and well frame repairs.	1,828 71	
Court, ambulance and doctors' fees	52 00	
Advertising tunnel and printing	545 06	
Services consulting engineer, tunnel	1,171 75	
Damages, August Wesserling	500 00	
Rubber boots	32 80	
Miscellaneous	494 49	
		$ 77,672 44
Woodmere Account—		
Foremen and labor	$ 711 92	
Refund	741 05	
		$ 1,452 97
Hamtramck Account—		
Superintendent, foremen and labor	$ 8,150 70	
Iron pipe	17,610 74	
Special castings	650 38	
Car tickets	20 00	
Hydrants and valves	325 00	
Brick	79 20	
Coal	22 00	
Cartage	122 41	
Rental	22 50	
Miscellaneous	6 25	
		$ 27,009 18
Ecorse Village Account—		
Pay rolls	$ 5,119 75	
Iron pipe	8,543 34	
Meter and fittings	166 25	
Brick	87 62	
Hydrants and valves	845 00	
Teaming	197 21	
Freight charges	23 08	
Car fare	20 00	
Miscellaneous	2 00	
		$ 15,004 25
Loan Account—		
Loan	$ 25,000 00	
		$ 25,000 00

INDEPENDENT.

Hurlbut Fund Account—	
Library pay rolls	$ 990 00
Labor pay rolls	2,509 03
Library furniture and fixtures	3 00
Towel supply	2 50

Shrubs, seed and pots	$ 120 66	
Subscriptions	4 00	
Tools, pipe and fittings	46 83	
Paint, oil and glass	6 63	
Car fare	2 00	
Printing and stationery	1 00	
Express and freight	7 50	
Miscellaneous	6 33	
		$ 3,699 48
Interest Account—		
Coupons	$ 57,329 00	
		$ 57,329 00
Bonded Indebtedness—		
Bonds redeemed	$ 90,000 00	
		$ 90,000 00

RECAPITULATION OF EXPENDITURES FOR OPERATION, MAINTENANCE AND CONSTRUCTION.

For Operation and Maintenance—		
Office account	$ 31,843 89	
Service connections	18,597 65	
Pumping water	72,835 98	
Repairing leaks	5,646 13	
Meter repairs and expense	1,863 18	
Percentage	6,524 24	
Inspection	7,788 08	
Horse, wagon and harness	973 58	
Office furniture and fixtures	288 32	
Real estate, revenue and expense	2,578 94	
Service connections, horse expense	909 85	
Repairing leaks, horse expense	735 19	
Pumping works, grounds only	8,806 38	
Plumbers' license	6 50	
		$159,397 91
For Construction—		
Iron pipe, extension account	$261,677 83	
Iron pipe, horse expense	2,182 13	
Meter account	10,380 17	
Engineering account	14,356 57	
Pumping works account	77,672 44	
Woodmere account	1,452 97	
Hamtramck account	27,009 18	
Ecorse account	15,004 25	
		$409,735 54

GENERAL RECAPITULATION OF EXPENDITURES.

Total operation and maintenance	$159,397 91
Total construction	409,735 54
Loan account	25,000 00
Total Hurlbut Fund	3,699 48
Total interest account	57,329 00
Total bonded indebtedness	90,000 00
	$745,161 93

The total receipts of the Receiving Clerk from July 1, 1903, to July 1, 1904, were as follows:

1903.		
July	$108,111 42	
August	72,091 86	
September	18,957 82	
October	85,504 89	
November	165,989 59	
December	15,341 94	
1904.		
January	91,283 41	
February	14,318 34	
March	14,200 65	
April	115,269 45	
May	24,959 79	
June	219,709 45	
Total receipts	$945,738 61	
Cash on hand June 30, 1903	2,781 19	
		$948,519 80

With bank deposits as follows:

1903.	
July	$104,794 42
August	76,772 21
September	16,680 82
October	84,866 31
November	168,843 41
December	14,190 69

1904.		
January	$ 87,192 92	
February	20,014 89	
March	12,234 86	
April	112,362 99	
May	28,022 60	
June	219,875 88	
	$945,852 00	
Cash on hand June 30, 1904	2,667 80	
		$948,519 80

Cash Statement for the Year Ending June 30, 1904.

		Dr.	
Cash on hand June 30, 1903		$ 2,781 19	
Cash in Bank—			
General Fund	$21,717 06		
Sinking Fund	67,379 09		
Hurlbut Fund	446 24		
Secretary Fund	1,000 00		
		90,542 39	
Total receipts		945,738 61	
			$1,039,062 19
		Cr.	
Cash on hand June 30, 1904		$ 2,667 80	
Cash in Bank—			
General Fund	$215,054 99		
Sinking Fund	74,415 24		
Hurlbut Fund	762 23		
Secretary Fund	1,000 00		
		291,232 46	
Total disbursements		745,161 93	
			$1,039,062 19

THE AMERICAN EXCHANGE NATIONAL BANK.
Detroit, Mich., July 1, 1904.

Benj. F. Guiney, Secretary of Board of Water Commissioners of the City of Detroit, Mich.:

DEAR SIR—This is to certify that the amounts of balances in this bank to the credit of the Board of Water Commissioners of the City of Detroit, at the close of business June 30, 1904, were as follows: General Account, $215,054.99; Sinking Fund, $74,415.24; Hurlbut Fund, $762.23; Secretary Fund, $1,000.00.

Yours truly,

W. WILLIAMS,
Auditor.

Assessments, 1904-1905.

Dist.	WARDS.	FAMILIES.			Increase.	Vacant Tenements.	ASSESSMENTS.		
		Supplied.	Not Supplied.	Whole Number.			1904-1905.	Increase.	Transf'rd to Meter Rolls.
1	Ninth.......	6,284	3	6,287	152	22	$19,505 30	$762 80	$226 90
	Fifteenth...	2,499	2	2,501	210	15	11,309 25	1,090 90	69 30
	Seventeenth	3,345	18	3,363	566	29	15,819 30	2,051 95	240 55
	Totals...	12,128	23	12,151	928	66	46,633 85	3,905 65	536 75
2	Eleventh...	4,402	1	4,403	147	24	15,420 50	989 05	144 15
	Thirteenth..	3,958	....	3,958	196	32	15,121 00	1,271 30	35 17
	Totals...	8,360	1	8,361	343	56	30,541 50	2,260 35	179 32
3	First........	3,623	....	3,623	177	40	20,104 00	728 70	114 10
	Seventh....	3,767	4	3,771	36	60	12,121 50	*Loss,* 67 10	221 80
	Totals....	7,390	4	7,394	213	100	32,225 50	661 60	335 90
4	Third.......	4,141	5	4,146	70	25	15,425 40	690 90	126 70
	Fifth........	4,668	2	4,670	125	50	16,030 40	669 00	124 20
	Totals...	8,809	7	8,816	195	75	31,455 80	1,359 90	250 90
5	Second.....	2,775	1	2,776	180	54	17,138 80	352 60	115 10
	Sixth........	4,410	1	4,411	132	32	17,463 00	552 80	49 50
	Totals...	7,185	2	7,187	312	86	34,601 80	905 40	164 60
6	Tenth.......	5,149	2	5,151	119	39	20,573 90	484 85	168 60
	Fourteenth.	3,439	8	3,447	139	31	13,838 70	816 10	203 50
	Totals...	8,588	10	8,598	258	70	34,412 60	1,300 95	372 10
7	Fourth.. ...	3,833	6	3,839	77	47	18,054 90	416 80	135 00
	Twelfth....	4,143	6	4,149	141	35	16,064 50	728 20	87 10
	Totals...	7,976	12	7,988	218	82	34,119 40	1,145 00	222 10
8	Eighth......	4,328	3	4,331	52	12	18,313 10	506 00	72 30
	Sixteenth...	5,230	31	5,261	189	19	19,571 10	1,691 50	67 10
	Totals...	9,558	34	9,592	241	31	37,884 20	2,197 50	139 40
	Grand Total	69,994	93	70,087	2,708	566	$281,874 65	$13,736 35	$2,201 07

As shown in this table, July 1, 1904, there were 70,087 families supplied with water. Using the average per family obtained as in previous years, 5.04, the population of the city at that time was 353,238, an increase over July 1, 1903, of 13,648.

The average used was obtained by taking the population as shown by the United States Census of 1860-70-80-90, and 1900, and dividing by the number of families on Assessors' books for those years, as follows:

Years.	Population per census.	No. of families assessed.	Average.
1860	45,619	8,973	5.08
1870	79,757	14,717	5.42
1880	116,340	22,423	5.18
1890	205,876	42,059	4.80
1900	285,704	60,524	4.72

Making the general average 5.04.

The following table shows the receipts for water rates during the year, arranged by districts, and giving the amount collected upon each annual assessment:

RECEIPTS OF WATER RATES BY DISTRICTS,

From July 1st, 1903, to July 1st, 1904.

YEARS.	1st District Wards 9, 15 and 17.	2d District, Wards 11 and 13.	3d District, Wards 1 and 7.	4th District, Wards 3 and 5.	5th District, Wards 2 and 6.	6th District, Wards 10 and 14.	7th District, Wards 4 and 12.	8th District, Wards 8 and 16.	Meters.	Total.
1897–98			$ 50			$3 50				$4 00
1898–99						1 27				1 27
1899–00			9 10							9 10
1900–01					$5 65		$3 75			9 40
1901–02	$2 40	$6 75	12 39		404 09		1 77			427 40
1902–03	1,206 18	769 69	852 37	$747 22	1,268 57	728 99	831 56	$892 87		7,297 45
1903–04	43,762 78	28,797 39	31,409 56	29,979 46	33,186 27	33,291 29	32,802 44	36,148 65	$155,266 06	424,643 90
Total..	$44,971 36	$29,573 83	$32,283 92	$30,726 68	$34,864 58	$34,025 05	$33,639 52	$37,041 52	$155,266 06	$432,392 52

Estimated Valuation of Works.

Real estate	$ 441,671 75
Buildings, docks, basins, conduits, engines, etc., at pumping station	2,249,351 16
Water pipe in use	4,432,552 86
Meters in use	103.337 58
Office furniture and fixtures	8,555 46
Tools and material on hand:	
In office of Civil Engineer	24,118 35
In office of Supt. of Construction	310 00
In Inspection Department	135 00
In Meter Department	2,846 19
In Pumping Works Department	13,283 20
In Hurlbut Fund Department	2,071 14
At Storage Yards	66,223 61
	$7,344,456 30

The amount expended for the Pumping Works to July 1st, 1904, is as follows:

ITEMS.	Previously Expended.	July, 1904.	Total.
Land	$38,331 44	....	$38,331 44
Force Mains	624,058 03	....	624,058 03
Inlet Pipe	102,428 65	$1,828 71	104,257 36
Docks, Basins and Canal	152,923 86	....	152,923 86
Conduits and Wells	248,333 54	40,207 27	288,540 81
Engine, Boiler and Coal Houses	311,582 85	16,954 97	328,537 82
Stand Pipe and Tower	31,674 25	....	31,674 25
Pump Wells	54,221 56	....	54,221 56
Engines	510,728 87	15,000 00	525,728 87
Boilers	96,551 27	....	96,551 27
Engineer's House	8,139 75	....	8,139 75
Sewers	6,666 25	....	6,666 25
Electric Light Plant	2,906 87	201 93	3,108 80
Inspection	5,422 54	....	5,422 54
New Gallery	8,249 10	....	8,249 10
Traveling Crane	2,390 00	....	2,390 00
Grounds, Fences and Gateway	168,509 33	8,499 81	177,009 14
Library, Greenhouse and Belvedere	34,940 91	306 57	35,247 48
Tunnel and River Shaft	....	1,716 81	1,716 81
Miscellaneous	20,576 02	1,762 75	22,338 77
Totals	$2,428,635 09	$86,478 82	$2,515,113 91

Water Works Bonds.

The following table shows the whole history of the bonded indebtedness of the Board, in which it will be seen that the total amount of bonds issued is $2,550,000, of which $1,267,000 have been redeemed or refunded, leaving outstanding $1,283,000.

The $100,000.00 seven per cent. bonds which matured September, 1899, and $100,000.00 seven per cent. bonds which matured February 1st, 1900, were on the latter date refunded at three and one-half per cent.

No. of Issue.	Act of	Issued.	Payable.	Amount.	Rate of Interest.	Redeemed or Refunded	Outstanding.
1st	1853	Aug. 1, 1853	Aug. 1, 1883	$100,000	7cts.	$100,000	....
"	"	" "	Aug. 1, 1878	100,000	7 "	100,000	....
"	"	" "	Aug. 1, 1873	50,000	7 "	50,000	....
2nd	1855	Aug. 1, 1855	Aug. 1, 1890	100,000	7 "	100,000	....
"	"	June 12, 1855	Aug. 1, 1885	100,000	7 "	100,000	....
"	"	" "	Aug. 1, 1880	50,000	7 "	50,000	....
3rd	1857	Aug. 1, 1858	Aug. 1, 1893	150,000	7 "	150,000	....
"	"	Aug. 1, 1867	Aug. 1, 1887	100,000	7 "	100,000	....
* 4th	1869	Feb. 1, 1870	Feb. 1, 1900	100,000	7 "	100,000	....
5th	"	Aug. 1, 1872	Aug. 1, 1902	50,000	7 "	50,000	....
6th	"	Aug. 1, 1873	Aug. 1, 1903	50,000	7 "	50,000	....
"	1873	Feb. 1, 1874	Feb. 1, 1904	50,000	7 "	48,000	2,000
7th	1869	Aug. 1, 1874	Aug. 1, 1904	50,000	7 "	6,000	44,000
"	1873	" "	" "	200,000	7 "	3,000	197,000
"	"	June 1, 1875	June 1, 1905	150,000	7 "	2,000	148,000
"	"	June 1, 1876	June 1, 1906	200,000	6 "	8,000	192,000
* "	"	Sept. 1, 1880	Sept. 1, 1899	100,000	4 "	100,000	....
"	"	April 1, 1881	April 1, 1897	100,000	4 "	100,000	....
"	"	Dec. 1, 1881	Dec. 1, 1896	50,000	4 "	50,000	....
"	"	Jan. 10, 1895	Jan. 10, 1925	100,000	4 "	....	100,000
*Refund	1869 1873	Feb. 1, 1900	Feb. 1, 1930	200,000	3½"	....	200,000
	1873	Jan. 1, 1903	Jan. 1, 1933	50,000	3½"	....	50,000
	1901	Sept. 1, 1903	Sept. 1, 1933	150,000	3½"	....	150,000
	"	June 1, 1904	June 1, 1934	200,000	3½"	....	200,000
				$2,550,000		$1,267,000	$1,283,000

Respectfully submitted,

BENJ. F. GUINEY,
Secretary.

REPORT OF THE GENERAL MANAGER.

Detroit, July 1, 1904.

To the Board of Water Commissioners of the City of Detroit:

GENTLEMEN—I respectfully submit a report of the general operations of the works for the year ending June 30, 1904.

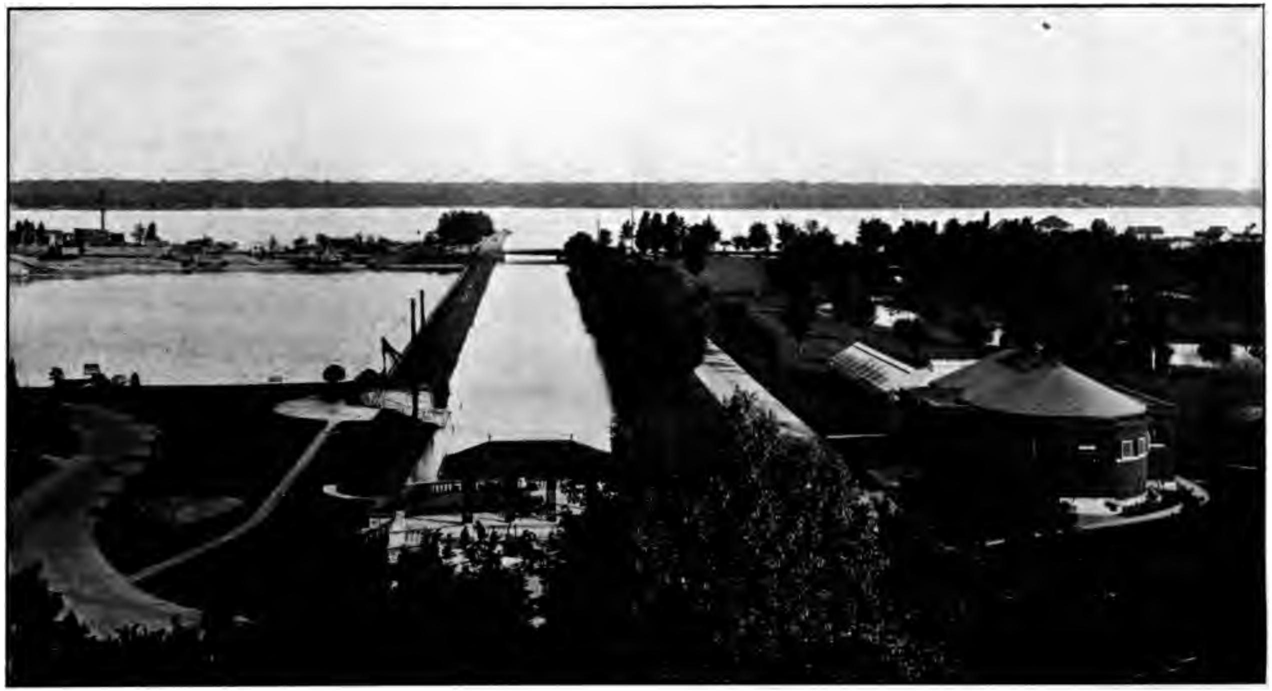
The assessment rolls of water rates show a gain over the previous year of $13,736.35. During the year places on the assessment rolls with a total assessment of $2,201.07 were transferred to the meter rolls.

The increase of families on assessment rolls for the same period was 2,708, an increase over the previous year of 159. The details as to the number of families assessed in each ward and district, vacant tenements, number of families not supplied, and increase of assessments by wards, will be found by reference to the table of assessments in the report of the Secretary.

The total number of gallons of water pumped during the year was 21,734,954,234, of which 65,652,708 gallons were supplied to the village of Woodmere; 187,339,592 gallons to the village of Delray; 33,040,656 gallons to the village of River Rouge; 45,975,820 gallons to the village of Hamtramck, and 21,227,492 gallons to the village of Highland Park.

The city receives double the city rates for all water supplied these villages.

The pumpage during the year was the largest in the history of the works, exceeding the previous year by 2,977,271,874 gallons. This was largely due to the unprecedented



BIRDSEYE VIEW SETTLING BASIN, CANAL AND LIBRARY.

severe winter, water being let run everywhere to prevent freezing. Under the serious conditions prevailing during the cold period, while deprecating the enormous waste, it was deemed advisable, for the benefit of the citizens, not to attempt its curtailment.

The average daily consumption of water (including villages) was 59,385,121 gallons, an average daily increase over last year of 7,994,210 gallons. The highest day's pumpage was 94,067,016 gallons on Tuesday, February 16, 1904, and the lowest was 41,933,900 gallons on Sunday, November 22, 1903.

The amount received for metered water was the sum of $155,266.06, of which amount the village of Delray paid $8,438.82; the village of Woodmere, $2,962.92; the village of River Rouge, $1,495.40; the village of Hamtramck, $2,077.48, and the village of Highland Park, $960.26.

Storage Grounds.

The houses and shops at the storage yard are in good condition. All pipe is now stored in the east yard and the old pipe platforms in that yard which were much decayed have been removed. The call bell and private telephone system connecting the houses of the emergency men with the office of the Superintendent of the yard have been of great service in securing prompt response to emergency calls.

Pumping Works.

The grounds of the Pumping Station have received the usual care. The main roads have been re-graveled and a cinder road constructed on the east line from the front line of the grounds to the river. Concrete piers have been built at two of the south intakes in the receiving basin and work is progressing on the remaining one. The east bank of the basin is being graded and sodded. A concrete floor was placed in the east coal shed. Lockers, shower bath, and other conveniences have been provided for the engineers in the new addition to the pumping house. Hinged screens have been placed in all of the intake piers so that in case of emergency they can be thrown open without injury to them.

A thorough examination, by diver, of the river intakes was made and two breaks found, one in the east and one in the middle intake. Both were repaired by diver and intakes were reported in good condition. The new ten-foot shore tunnel, 1,032 feet in length, with shore shaft, extending from the pumping house to connect with the river tunnel has been completed. The contract for the ten-foot river tunnel of vitrified brick, extending under the river to the head of Belle Isle, a distance of 3,160 feet, was awarded C. H. Fath & Son, of Cleveland, for the sum of $32.40 per foot, and the contract for the intake crib and crib house to the W. J. Gawne Co., of Cleveland, for the sum of $74,750. The work is progressing very favorably and will be completed, should nothing unforeseen occur, in about eighteen months.

The two new Allis-Chalmers engines have been placed in commission and duty tests will be made prior to October 1, 1904. These engines pump the water for the upper system, the old engines supplying the lower system. Division of these systems was made December 5, 1903. The new engines started their year of probation January 18, 1904.

The following table shows the amount of water pumped each year from 1852 to 1904:

YEARS.	FAMILIES SUPPLIED.	WATER PUMPED.	
		TOTAL QUANTITY.	PER FAMILY.
1852	......	235,840,275	......
1853	4,283	303,531,743	70,868
1854	4,619	376,265,126	81,460
1855	5,282	542,807,364	102,765
1856	5,706	692,124,305	121,297
1857	6,189	697,190,523	112,650
1858	6,474	718,091,207	110,919
1859	6,794	782,112,587	115,118
1860	6,750	870,036,451	125,185
1861	7,128	895,129,423	125,579
1862	7,275	994,945,329	136,762
1863	7,699	1,035,798,043	134,534
1864	7,993	1,019,390,256	127,410
1865	8,351	1,040 514,887	125,675
1866	9,089	1,196,317,922	131,622
1867	10,242	1,425,535,230	139,186
1868	11,544	1,666,545,125	144,364
1869	12,774	1,946,810.325	152,400
1870	13,722	1,866,060,068	136,000
1871	14,896	2,300,150,605	154,414
1872	16,035	2,782,292,578	173,513
1873	17,019	3,198,393,948	187,930
1874	18,853	3,289,872,635	174,511
1875	19,606	4,207,454,260	214,600
1876	20,102	4,065,134,470	200,225
1877	20,345	4,213,239,790	207,090
1878	20,603	4,345,743 330	210,927
1879	21,341	5.129,599,110	240,348
1880	22,465	5,552,965,310	247,183
1881	23,749	6,543,127,968	279.722
1882	25,442	6,284,000,742	243,062
1883	27,415	7,379,327,788	269,170
1884	29,424	8,510,614,140	289.260
1885	30,533	9,970,829,580	326,886
1886	31,946	10,576,571,254	331,070
1887	34,486	13,168,859,808	381,860
1888	36,863	14,380,166,670	390,098
1889	39,158	12,875,334,453	328,880
1890	41,467	12,120,944,532	292,300
1891	43,933	12,057,261,236	274,470
1892	46,400	12,276,612,482	264,582
1893	49,817	13,877 977,208	278,579
1894	49,912	13,649,779,605	273,476
1895	51,426	14,698,451,954	285,818
1896	53,941	13,254,369,371	245,719
1897	54,945	12,928,821,326	235,305
1898	56,341	14,278,682,058	253,433
1899	58,931	16,348,062,701	277,410
1900	60,524	17,077,100,477	282,154
July, 1901 to July, 1902	64,718	18,333,104,706	283,320
July, 1902 to July, 1903	67,280	18,757,682,360	275,440
July, 1903 to July, 1904	70,087	21,734,954,234	* 305,131

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* 353,236,268 gallons delivered outside Detroit; deducted from total pumped.

Pipeage System.

You are respectfully referred to the report of the Superintendent of Construction for details of the work done in this department during the year.

Dead ends have been regularly blown off, gates systematically examined and the system flushed in such districts as was necessary.

The only serious break in the system occurred about 4 a. m. of February 4, 1904, in the forty-two-inch main at Jefferson and Helen avenues. Although the weather conditions were extremely unfavorable, the temperature being below zero, the break was controlled and water furnished the district through other supply mains in so short a time that no inconvenience to the consumers was incurred.

A large amount of pipe for increased fire protection was laid during the year. The most important being in the locality of Adams, Wilcox, Witherell and John R. streets: Twelfth, from the Boulevard to Stanley; Milwaukee, from Mt. Elliott to Harper avenue; Hastings, from Trombley to the Boulevard; Cass, from the Boulevard to Milwaukee: Merrick and Stanton, and Beaufait avenue along the Belt line. The 42-inch main from the Pumping Station, north to Hurlbut and Sylvester streets, under construction last year, has been completed. Fifteen hundred and eighty feet of 16-inch pipe was laid in River street, from Second to Sixth street, and the construction of a 42-inch line was commenced to extend in River street, from Sixth to Stanton, thence to Fort, to Vinewood avenue. This work is progressing rapidly and is expected to be completed this year.

The total mileage of the distribution system July 1, 1904, was 644 miles and 1,563 feet, of which 559 miles and 88 feet are within the city limits, and 85 miles and 1,475 feet in the adjoining villages. Twenty-seven miles and 263 feet were laid during the year, of which 1,785 feet were laid in the village of Delray; 5,715 feet in the village of River Rouge; 4,836 feet in the village of Woodmere; 6,783 feet in the village of Highland Park; 27,425 feet in the village of Ecorse, and 46,049 feet in the village of Hamtramck; said villages paying the entire cost thereof. There were 1,328 feet of pipe in the city replaced by a larger size and 1,782 feet in the villages.

Data Detroit Water Works, July 1, 1903, to July 1, 1904.

System of water works: Direct pressure. No reservoir.

Source of supply: Detroit River.

Number of pumping stations: One.

Type of pumps: One 30,000,000 Comp. Beam; two 24,000,000 Comp. Beam; one 24,000,000 triple Allis, two 25,000,000 triple Allis-Chalmers. Total daily capacity, 152,000,000.

Area of city: 29 square miles.

Pumpage: 21,734,954,234.

Consumption, gallons, unmetered: 16,217,317,474.

Consumption, gallons, metered: 5,517,636,760.

Average daily consumption: 59,385,121.

Consumption, per capita (city—State census): 183 gallons.

Revenue, unmetered water: $277,126.46.

Revenue, metered water: $155,266.06.

Revenue, per 1,000 gallons metered water: .0269.

Revenue, per 1,000 gallons unmetered water: .017.

Number of meters: 5,957.

Kind of coal used: Bituminous, run of mine.

Price, per ton: $2.44½ in sheds.

Average head against pumps in feet: 115.

Number of miles mains: 644.

Number of fire hydrants: 4,100.

Fire cisterns: 558. Capacity, 4,830,000 gallons.

Service taps: 66,226.

Gates: 7,603.

The following is the report of the Board of Health of examination of the water supply for the month of June, 1904:

	PARTS PER MILLION.
Appearance—Nearly clear.	
Total solids	114.0
Volatile matter	38.4
Non-volatile matter	75.6
Free ammonia	.004
Albuminoid ammonia	.062
Nitrogen as nitrates	.13
Nitrogen as nitrites	.00
Chlorine	2.75
Oxygen absorbed in 15 minutes	.48
Oxygen absorbed in 4 hours	.88
Bacteria per cubic centimeter:	
June 17, 1904	440
June 20, 1904	319
June 21, 1904	290

No colon bacilli found.

Conclusion: Water is in good condition.

Respectfully submitted.

W. I. TIBBALS,
Chemist and Bacteriologist.

All of which is respectfully submitted.

H. S. STARKEY,
General Manager.

REPORT OF THE CIVIL ENGINEER.

Detroit, Mich., July 1, 1904.

To the Board of Water Commissioners of the City of Detroit:

The report of the Civil Engineer for the year ending June 30, 1904, is respectfully submitted.

Intakes.

The three intake pipes and strainer boxes in the river were thoroughly examined and repaired by a diver who was employed 39½ days between August 16 and October 5th. All joints between the shore and deep water at the channel bank were recalked tight except where buried in mud bottom. A new iron patch 5 feet square was placed on the center intake and one 2 feet square on the upper one. Two old patches were made tight, and the relief valves on the upper and lower intake strainer boxes cleaned and put in working order. The diver reports no valve on the center strainer. Piles and saddles are 25 feet apart on the upper and middle intakes, and 12 feet apart on the lower intake, from the shore to the channel bank in each case.

The strainer at the end of the lower 72-inch intake was built in 1884. It consists of two rectangular structural iron strainer boxes 5 ft. x 6 ft. x 30 ft. each. These boxes are set 55 feet apart and at right angles to the current, water being taken in on the down stream side through vertical white oak slats. A valve box fitted with a self-acting relief valve is set at the end of the intake pipe, and each strainer box is connected to the valve box by a short pipe four feet six inches in diameter. The upper strainer box has five slat frames, and the lower has six. Each slat frame originally contained forty-two white oak slats 46″x3½″x¾″, which were tapered from ¾″ thick at the front edge to ½″ thick at the back. The slats were set 1¼″ centers, leaving a clear opening of ½″ at the front edge of the slats. Every other slat was removed in 1889, increasing the net strainer area from 74 sq. ft. to 128 sq. ft.

The old slats were found nearly eaten away and were all removed. Twelve new slats were placed in each of the first two frames nearest the valve box in each strainer box, ten in the second two frames, and eight in each of the remaining frames at the outer end of the strainer boxes. Silt has been deposited around this strainer in considerable quantities on account of the strainer boxes being placed across the current.

The strainer at the end of the center, or 5′ intake pipe is similar to the above in general design, except that the strainer boxes are placed with, instead of across, the current, and there are six slat frames in each box. All old slats were removed and new ones put in the same as above.

The upper strainer is set with the current and has six slat frames in each box. No new slats were required in this strainer, but enough of the old slats were cut out to increase the clear opening between them from 1¾″ to 9″ in each of the twelve frames.

Ice Shields.

To prevent a recurrence of the ice trouble experienced during the previous winter at the settling basin outlets, an ice shield was built in front of each of the three outlet piers in October. A hood of one inch boards extending about five feet below mean water and flaring out slightly at the bottom, is supported on a timber frame at a distance of about five feet from the face of the pier. Screens built of 2″x¼″ iron bars spaced 1″ centers are set between the hood and the opening in the pier through which water enters on its way to the strainer wells. These screens have an avarage surface area of

147 sq. ft. for each shield, and extend about ten feet below the surface. The screens are thus protected from the surface ice by the hoods and at the same time so arranged that they may be easily raked to keep them clear, or even removed altogether in case of need. In so far as it is safe to draw conclusions from a single year's trial, the ice shields are entirely satisfactory, no difficulty whatever having been experienced with them during the entire ice season.

As an additional precaution, strainer well No. 4 has been fitted with a strainer which may be lifted in sections and the strainer in well No. 5 has been rebuilt with hinged drop sections which can be lowered without delay in emergency.

Anchor Ice.

On November 17th the temperature of the air fell 39° Fahr. in 24 hours, from 60° to 21°, and there followed continuous cold weather without a thaw for over two months. Ice began to form in the settling basin and along the edge of the river on November 25th. At this date the temperature of the water was 35.0° in the main channel, 33.8° at the end of the water works dock, 34.4° entering the settling basin, and 34.0° leaving the basin. The mean temperature of the air was 18°, max. 23°, min. 13°. The basin was frozen over within a few days, but the river remained partially open and contained floating ice until December 14th, when the temperature fell to zero and solid ice was formed. The river remained frozen until March 3d, when the ice in the river and lake, rotted by the heavy rain of four days previous, broke up and began to run heavily. Ice continued to float down the river until March 9th, on which date the channel was clear and the water had reached a temperature of 34.0° Fahr.

On the night of March 3d ice began to clog the river strainer on the 5 ft. intake pipe and the screen in the strainer well on the lower 6 ft. intake. The water was drawn down four feet in the basin at 11:00 p. m., at which time the lower intake screen was opened, and water began to rise in the basin, gaining five inches by 2:00 a. m. From 2:00 o'clock until 5:00 a. m. the water was gradually lowered until it reached the top of the suction valve boxes on the pumps, and the supply to the city was cut down to about two-thirds normal until 7:00 a. m., when the upper 6 ft. intake, which had remained closed until this time, was opened, and the supply again became ample. With this one exception there was no trouble from ice during the entire season, and it is believed that the removal of slats from the outer strainer boxes has greatly decreased the danger of ice stoppage. It has not been necessary to use the emergency valve or emergency conduit.

Temperature of Water.

Beginning on November 1st, daily temperature readings were taken for the purpose of determining the danger period during which ice troubles may be expected, and also the number of degrees which water is warmed in winter and cooled in summer while passing through the distributing pipe lines. For the latter purpose observations were taken upon water (1) entering the basin, (2) leaving the basin, (3) drawn from the tap at 1285 Jefferson avenue, (4) at 156 National avenue. Standardized thermometers graduated to 1-5° were used, and where drawn from a tap, water was allowed to run freely for fifteen minutes before taking readings, although no change could be detected after the first three or four minutes.

The greatest drop in the temperature of the water in the basin was 5.2° in 24 hours, from 43° to 37.8°, on November 17-18, during which time the air fell from 32° to 20°. When no ice was present the water in the river and basin was ordinarily about 2° warmer at 4:30 p. m. than at 8:00 a. m. The temperature was uniformly 32.2° from the time the ice formed until it went away; for this reason the basin readings were omitted for the month of February. The following table shows the high, low, and average results for each half month period:

TABLE NO. 1.

	TEMPERATURES.															NOTES.
	Water entering basin.			Water leaving basin.			Water at 1285 Jefferson Ave			Water at 156 National Ave.			Air, U. S. Weather Bureau, Detroit.			
	Av'g	H	L	Av'g	H	L	Av'g	H	L	Av'g	H	L	Av'g	H	L	
November 1st half	46.8	51.6	43.0	46.9	51.3	43.3	51.0	52.9	48.2	53.3	53.8	52.9	42.4	65	26	
November 2nd "	36.1	43.8	32.4	35.9	43.8	32.4	44.3	48.0	41.5	49.9	52.5	44.0	27.4	60	13	November 26, ice forming.
December 1st "	32.4	33.6	32.1	32.4	32.8	32.2	39.3	41.4	37.9	44.3	45.0	44.0	23.6	38	1	December 13, watchmen placed.
December 2nd "	32.3	32.5	32.2	32.2	32.6	32.2	37.2	37.9	36.0	43.5	44.5	43.0	21.6	39	1	December 14, river frozen over.
January 1st "	32.3	32.5	32.2	32.3	32.6	32.2	36.2	36.5	35.8	42.7	43.0	42.0	18.3	36	1	
January 2nd "	32.3	32.4	32.2	32.3	32.6	32.2	35.5	36.2	35.2	42.0	43.0	41.5	16.9	42	—6	
February 1st "	....	....	....	....	....	....	35.2	36.0	34.8	40.9	42.0	40.5	13.9	45	—6	
February 2nd "	....	....	....	....	....	....	34.2	34.4	34 0	39.5	41.0	38.5	18.9	42	—9	February 28, heavy rain.
March 1st "	32.9	33.2	32.5	33.0	33.8	32.6	34.1	34.2	34.0	37.9	38.5	37.0	35.5	48	13	March 3, ice running.
March 2nd "	33.1	36.0	32.2	33.1	34.2	32.2	34.4	35.0	34.2	38.7	39.0	38.5	35.6	62	18	March 4, strainers clogged.
April 1st "	34.2	37.8	32.6	34.8	37.6	32.6	35.5	36.7	34.4	38.8	39.5	38.0	38.4	55	25	March 9, river clear of ice.
April 2nd "	40.2	45.2	35.6	40.3	45.4	35.5	38.9	42.0	37.0	40.0	43.0	39.5	42.9	73	22	April 23, temperature 40° at all points.
May 1st "	51.5	55.0	44.7	51.0	54.0	44.8	47.4	49.0	43.6	48.3	51.0	44.5	57.8	80	38	
May 2nd "	54.6	60.9	48.2	54.6	60.0	48.4	50.8	52.8	49.0	51.8	54.0	50.0	60.4	88	40	
June 1st "	60.2	67.0	55.0	60.3	66.8	55.6	56.5	60.0	53.1	56.7	59.0	54.5	65.4	82	50	
June 2nd "	66.1	68.6	63.0	66.3	68.8	63.2	61.6	64.2	60.0	61.8	64.5	60.0	68.2	87	52	

From this table it will be seen that the water passing through the pipes is materially warmed throughout the entire winter; the greatest increase in temperature occurs in the second half of November and is 13.8° at 156 National avenue. The coldest water is in the first half of March, when the temperature at National avenue averaged 37.9°, or 5.9° above freezing.

The neutral point is reached in the second half of April, when the water entering the system at about 40° is neither warmed nor cooled. From this time on through the summer months the cooling effect is considerable, reaching an average of 4.7° during the second half of June at 1285 Jefferson avenue. The cooling effect is probably considerably greater in August and September. It should be observed, however, that the water in the house service pipes below ground is frequently cooler than it is in the street mains; therefore water drawn from a tap after wasting 15 or 20 seconds will usually be cooler than that drawn after wasting several minutes.

For the further explanation of the table it may be added that the water at 1285 Jefferson avenue passes through approximately 9,000 feet of 42″ pipe and 300 feet of 6″ pipe; at 156 National avenue it passes through 31,000 feet of 42″ to 24″ pipe, 290 feet of 6″ pipe, and 90 feet of 4″ pipe. The velocity through the larger mains averages 2½ feet per second.

The entire system, exclusive of house plumbing, contains 15,337,000 gals. With the present rate of consumption the water remains in the system an average of only six hours from the time it leaves the pumps until used by the consumer.

Shore Tunnel Progress.

The ten foot shore tunnel and junction well has been completed with the exception of valves. Work is progressing rapidly on an eight foot header leading from the junction well to the basin inlet piers. This work when completed will permit water from the 10 ft. intake tunnel to go to the pumps either direct or through the settling basin, as desired.

River Tunnel.

The tunnel plans and specifications were completed December 23, on which date J. V. Davies, C. E., of New York, an experienced tunnel engineer, was employed in the capacity of consulting engineer prior to the letting of contracts. All features of the work were carefully considered in detail by the civil and consulting engineers, and final plans and specifications jointly approved early in February. Bids were opened March 23rd, and contracts for the work executed April 8th, (see note on drawing).

The tunnel contractor's plant is erected, and the air lock nearly completed. Work began on the tunnel June 13th.

The crib is being built at the foot of 21st street, the four bottom, or floor courses, being completed at the close of the year, June 30th.

The accompanying plate shows a longitudinal section and elevation of the intake tunnel and river tower. The river tower comprises essentially (1) an eight-sided timber crib terminating four feet below mean water, filled with concrete, and containing an open center well and 24 cast iron ports; (2) a concrete superstructure oval in form and faced with granite masonry; (3) a circular crib house with Gray Canyon Berea sandstone walls, glazed tile conical roof, octagonal copper-covered lantern and copper cornice, all as shown and described in detail in the regular plans and specifications. The general dimensions are as follows: Tunnel, 10′ inside diameter, 3160′ center to center of shafts; timber crib 67′ 11″ x 52′ 8″ over all; crib house 37′ inside diameter, walls 19′ 5″ above concrete floor.

Pressures.

The monthly maximum, minimum and average pressure gauge records compiled from hourly readings at the various fire department stations in the city, as well as the frictional loss at each, are given in the table following page 41. The new triple-expansion pumps having been completed, the pressure on the upper system was increased to sixty pounds at the pumps, December 5th, 1903. Under normal conditions no complaints of short supply have been received from the upper district since the pressure has been raised. In order to distribute the pressure according to the demands made upon various parts of the low pressure system, certain gates are closed or throttled in addition to the sealed gates which divide the two systems. The following table gives the location, size and condition of each, June 30, 1904.

TABLE NO. 3.

Gates temporarily closed or throttled in addition to sealed gates dividing the system.

LOCATION.	SIZE.	CONDITION.	N.	E.	S.	W.
Scott and Chene	30 in.	Closed.			15′-5″ N.	21-′0″ E.
Canfield and Alley, E. of St. Antoine	30 "	"		6′-3″ E.	28′-4° N.	
Orleans and Scott	30 "	"		16′-4″ W.	29′-7″ N.	
S. Fifteenth and Buchanan	24 "	"			0″	24′-6″ E.
E. Vinewood and Buchanan	30 "	6 turns open.		11′-5″ W.	23′-0″ N.	
S. Brush and Watson	20 "	Closed.	20′-9″ S.			25′-6″ E.
W. Sixth and Bagg	20 "	"			23′-0″ N.	17′-0″ W.
S. Brooklyn and Grand River	8 "	"			7′-0″ N.	26′-10″ E.
S. Thirteenth and Grand River	6 "	"			0″	19′-6″ E.
E. Mack and Chene	4 "	"	20′-0″ S.	1′-0″ E.		
Vinewood and F Street	24 "	18 turns open.		24′-0″ W.	0″	
N. Twenty-fourth and Linden	10 "	3 " "	0″			24′-0″ E.
S. Maybury and Linden	8 "	3 " "		23′-0″ W.	0″	
N. Sixteenth and Linden	8 "	3 " "	0″	26′-0″ W.		
S. Fourteenth and Buchanan	8 "	3 " "			0″	32′-1″ E.
Scott and Chene	30 "	Closed.			22′-8″ N.	10′-7″ W.
Collins and Superior	30 "	"	23′-0″ S.	20′-8″ W.		
Chene and Mack	30 "	"	23′-0″ S.			21′-0″ E.

Population.

The population and yearly growth of the city are subjects of live interest to every citizen, and as the value of water works statistics is largely dependent upon the accuracy with which the population is determined, the following data has been carefully compiled and verified. Accepting the United States census returns as correct for each decade, the most available and most accurate data upon which to base an estimate for intermediate years is found in the annual water works count of families. There are two complications. First, the city line is extended to take in new territory at irregular intervals, causing the apparent population to increase in an irregular manner, while the true increase is at an almost uniform rate. There have been nine such extensions since the first United State census was taken in 1820, and there is at present a population of 30,000 just over the boundary line, which is practically but not officially a part of the city. This population is distributed, according to the Michigan State census of 1904, as follows:

TABLE NO. 4.

	No. of Families.	Population.
Gratiot Township	240	**1,308**
Greenfield Township	515	**2,222**
Hamtramck Township	415	**2,081**
Springwells Township	950	**4,999**
Delray Village	1,327	**6,627**
Ecorse Village	171	**741**
Fairview Village	247	**1,105**
Grosse Pointe Village	87	**417**
Grosse Pointe Farms Village	105	**615**
Hamtramck Village	306	**1.559**
Highland Park Village	153	**612**
River Rouge Village	525	**2,474**
St. Clair Heights Village	122	**545**
Woodmere Village	1,037	**5,084**
Totals	6,200	**30,285**

Average number persons per family, 4.885.

The second difficulty arises from the fact that the water works extensions are not confined to any boundary lines. It is therefore necessary to exclude from the water works count all families supplied outside the city limits in order to get a comparison on census years. This is done in the following table:

TABLE NO. 5.

Water Works Count.

YEAR.	TOTAL NO. FAMILIES ASSESSED.	FAMILIES OUTSIDE CITY.	FAMILIES IN CITY NOT ASSESSED.	NET NO. FAMILIES IN CITY.
1860	6,950	Not given.	2,023	8,973
1870	13,722	" "	995	14,717
1880	22,465	310	268	22,423
1890	41,467	91	683	42,059
1900	60,524	*259	136	60,401
1904	69,994	*533	93	69,554

*Exclusive of Villages.

Now, comparing the net number of families in the city shown in the last column, with the U. S. census returns, the following table is obtained:

TABLE NO. 6.

Persons per Family.

YEAR.	FAMILIES U. S. CENSUS.	FAMILIES D. W. W.	% D.W.W. IS LOW.	POPULATION U. S. CENSUS.	PERSONS PER U. S. FAMILIES.	PERSONS PER D. W. W. FAMILIES.
1860	Not given.	8,973	....	45,619	....	5.084
1870	15,636	14,717	5.9%	79,577	5.089	5.407
1880	23,290	22,423	3.7%	116,340	4.995	5.188
1890	42,209	42,059	0.4%	205,876	4.877	4.895
1900	60,505	60,401	0.2%	285,704	4.722	4.730
1904	*70,225	69,554	1.0%	*317,591	4.522	4.566

*Michigan State Census, 1904.

From the last two columns of this table it is evident that the number of persons per family is decreasing as the city increases in size. This conclusion may be actually true or it may be due to the interpretation of the term family under the rules of the census bureau. Be this as it may, the fact must be taken into consideration in making estimates.

It is also evident that the water works count for the years 1870 and 1880 are much lower than the census count, while the two counts are surprisingly close together for the years 1890 and 1900. It therefore seems probable that the number of persons per family in 1910 will be somewhere between 4.54 and 4.60. Assuming a mean value of 4.57, the number of persons per family to be used for estimating purposes until the next census gives opportunity for correcting, is as follows:

1900	4.730	1906	4.634
1901	4.714	1907	4.618
1902	4.698	1908	4.602
1903	4.682	1909	4.586
1904	4.666	1910	4.570
1905	4.650		

Using 4.666 persons per family, the population of the city according to the water works count for 1904 is 69,554× 4.666=324,539 instead of 317,591 given by the State census; in either case the error is only about 2%, and as the State census is official it seems proper to accept it.

If the method of averaging the number of persons per family for each census year since 1860 is adopted, as has been the custom in using water works estimates, the average would be 5.061, and the population 5.061×69,554=352,013, which would be about 11% in error according to the State census. Moreover, as this method does not give results which conform to the United States census returns, it does not seem good policy to continue its use. The population supplied, estimated on the basis of the State census, is as follows:

Detroit	317,591
Add 533×4.566 (furnished outside limits)=	2,434
	320,025
Deduct 93×4.566 (number persons inside limits not supplied)=	429
Net number persons supplied exclusive of villages	319,596

The water works count of families does not extend to the incorporated villages which are supplied through meters; the population in these villages must therefore be estimated from the number of taps, assuming that the number of persons per tap is the same as in the city. The total number of taps in the city is 63,656, and 319,596÷63,656=5.03 persons per tap.

TABLE NO. 8.

Net Number Consumers.

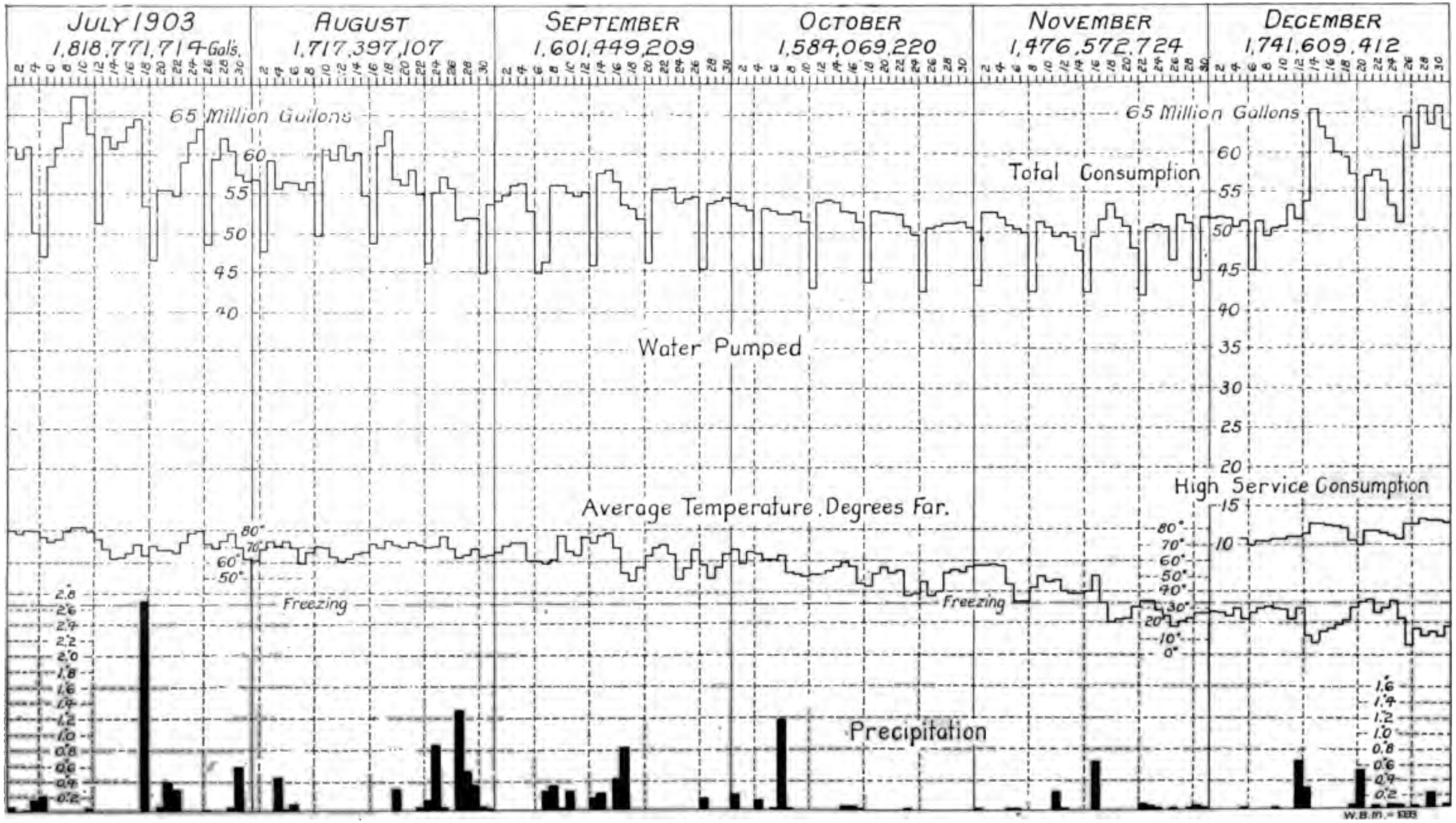
VILLAGE	NO. TAPS.	ESTIMATED POPULATION SUPPLIED.
Delray	1,082 × 5.03 =	5,442
Hamtramck	289 × 5.03 =	1,454
Highland Park	123 × 5.03 =	618
River Rouge	407 × 5.03 =	2,047
Woodmere	669 × 5.03 =	3,365
Detroit		319,596
TOTAL		332,522

Consumption.

The gallons of water pumped daily is graphically shown on the following plates, together with the total precipitation and mean temperature.

The register of the 42″ Venturi meter supplying water to the upper system was started November 11, 1903, and the record is shown from December 5th to June 30th.

DAILY WATER CONSUMPTION, AVERAGE TEMPERATURE AND PRECIPITATION.



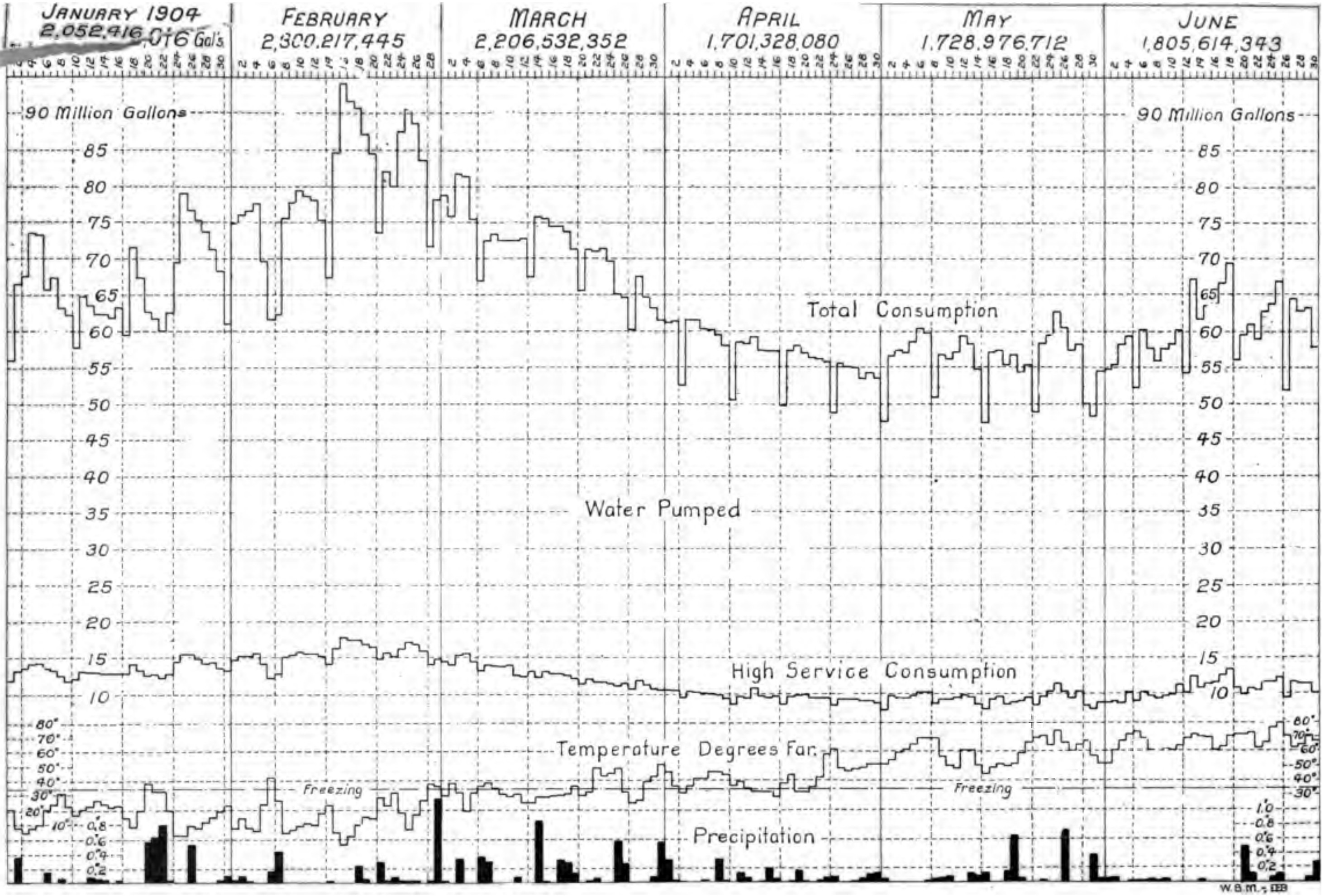

JANUARY 1904
2,052,416,016 Gal's
FEBRUARY
2,300,217,445
MARCH
2,206,532,352
APRIL
1,701,328,080
MAY
1,728,976,712
JUNE
1,805,614,343
90 Million Gallons
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
Total Consumption
Water Pumped
High Service Consumption
Temperature Degrees Far.
80°
70°
60°
50°
40°
30°
20°
10°
Freezing
Precipitation
1.0
0.8
0.6
0.4
0.2
W.B.M.

TABLE NO. 9.

Use of Water.

CORPORATION SUPPLIED.	U. S. GALLONS PUMPED July 1, 1903 to June 30, 1904.		Estimated Number of Consumers.	Gallons Daily per Consumer, 1903-4.	Gallons Daily perConsumer Previous Year. 1902-3.
	Total.	Daily Average.			
Detroit, unmetered. ...	16,217,317,274	44,309,610	319,596	182.8	160.0
Detroit, metered.......	5,164,400,692	14,110,384			
Delray, metered.......	187,339,592	511,857	5,442	94.1	92.0
River Rouge, metered..	33,040,656	90,275	2,047	44.1	36.0
Woodmere, metered....	65,652,708	179,379	3,365	53.3	21.6
Highland Park, metered	21,227,492	57,999	618	93.8	83.2
Hamtramck, metered...	45,975,820	125,617	1,454	86.4	126.5
TOTALS.........	21,734,954,234	59,385,121	332,522	178.6	161.7

Maximum hour, February 17, 9 to 10 a. m., 4,191,630 gallons.

Minimum hour, November 8, 4 to 5 a. m., 1,286,890 gallons.

Maximum day, February 16, 94,067,016 gallons.

Minimum day, November 22, 41,933,900 gallons.

Total Consumption, 21,734,954,234 gallons.

Daily average, 59,385,121 gallons.

Per cent. metered in city, 24.2 per cent.

Extensions.

The line of 42″ pipe from 6th to Vinewood was ordered laid on July 13th; the contract for pipe was let to the United States Cast Iron Pipe and Foundry Co. of Cleveland. The pipe is well made, and the test bars indicate rather better than average material; all material is on the ground,and work commenced at Sixth street. A line of 16″ pipe has also been laid in River street from Second to Sixth street. A total of 27.64 miles of pipe has been laid, of which over 60% is outside the city limits, all as shown in detail in the reports of other officers. The only serious break of the year occurred in the 42″ main at the corner of Jefferson and Helen avenues at 4:05 a. m. February 4th, 1904. The temperature of the air was one degree above zero and the water in the pipe 35.2° at the time of the break. The main at this point is about six feet deep and lies in the center of the car track. The frost was 4′ 10″ deep. The pipe appeared sound in fracture, and showed no signs of electrolytic action. An analysis of the iron showed it to be of a somewhat brittle composition.

Several good fire lines have been laid. The principal ones are as follows:

3,769 ft. of 12″ pipe on Milwaukee avenue from Collins to Mt. Elliott, thence on Mt. Elliott and Harper to Beaufait.

3,080 ft. of 12″ pipe on Beaufait from Sylvester to Theodore.

3,612 ft. of 10″ pipe on 12th street from Boulevard to Stanley, thence on Stanley to Wabash.

1,858 ft. of 10″ pipe on Bellevue from Theodore to Boulevard.

2,884 ft. of 10″ and 8″ pipe on Witherell and on John R, from Miami to Adams, Wilcox from Miami to Madison, Madison from John R to Wilcox, and Adams from Witherell to John R.

The total cost of lines laid for fire protection only is $34,404.74.

Recommendations.

I respectfully recommend that attention be given to the fire lines needed in the business and manufacturing districts. About $60,000 should be spent in this work. I also recommend that steps be taken to deepen and improve the present settling basin during the next summer season.

All of which is respectfully submitted.

CLARENCE W. HUBBELL,
Civil Engineer.

REPORT OF SUPERINTENDENT OF METERS AND INSPECTION.

Detroit, July 1, 1904.

To the Board of Water Commissioners:

Gentlemen—In compliance with the rules and regulations of your honorable body, I herewith report the work done in the Meter, Inspection and Service Cocks Departments from July 1, 1903, to July 1, 1904:

NUMBER OF METERS PLACED FROM JULY 1, 1903, TO JULY 1, 1904.

	SIZES.								
	⅝ in.	¾ in.	1 in.	1½ in.	2 in.	3 in.	4 in.	6 in.	Total
In service July 1, 1903	3,110	1,069	944	301	242	108	57	16	5,847
Placed during the year ending June 30, 1904	166	53	54	23	29	7	5	3	340
	3,276	1,122	998	324	271	115	62	19	6,187
Removed during the year ending June 30, 1904	167	13	26	9	10	3	2	......	230
Total number in service June 30, 1904	3,109	1,109	972	315	261	112	60	19	5,957

IN SERVICE JULY 1, 1904.

KIND.	SIZES.								
	⅝ in.	¾ in.	1 in.	1½ in.	2 in.	3 in.	4 in.	6 in.	Total
Thomson	3,076	1,092	923	306	242	103	47	19	5,808
Crown	20	12	23	7	5	3	2	......	72
Hersey	1	2	19	2	7	2	7	......	40
Worthington	7	3	7	......	7	4	2	.....	30
Union Rotary	4	......		......	......	......	1	......	5
Buffalo	1	......		......	......	......	......	......	1
Venturi	......	......	......	......	......	......	1	......	1
Aggregate	3,109	1,109	972	315	261	112	60	19	5,957

Indicators attached to hydraulic elevators.. 38

METERS IN STOCK.

KIND.	SIZES.							
	⅝ in.	¾ in.	1 in.	1¼ in.	2 in.	3 in.	4 in.	Total
Thomson	1	14	11	1	4	2	1	34
Crown	1	......	......	2	2	......	1	6
Worthington	......	......	......	......	......	1	......	1
Hersey	......	......	9	......	1	......	1	11
Aggregate	2	14	20	3	7	3	3	52

Valuation of meters in stock July 1, 1904		$1,318 00
Valuation of material on hand July 1, 1904		489 97
Valuation of tools, etc., July 1, 1904		474 22
Valuation of horses, wagons, etc., July 1, 1904		459 00
Valuation of furniture, fixtures, etc., July 1, 1904		105 00
Total valuation of stock on hand July 1, 1904		$2,846 19
Valuation of meters in service July 1, 1903		$100,948 47
Deduct 2 per cent. for depreciation in value	$2,018 96	
Deduct for meters sold	354 20	2,373 16
		$98,575 31
Add amount expended 1903-4 for meters placed		4,762 27
Total valuation of meters in service July 1, 1904		$103,337 58

One hundred and ten meters were added to the system during the past year, making the total number in use 5,957. Three hundred and forty meters were installed and 230 removed, 137 of those removed were from premises that formerly paid by meter but are now paying by assessed rates. There are still 373 meters on premises that are paying by assessed rates as against 510 last year and 1,113 July 1, 1899. The greater portion of those remaining will be removed during the coming year and installed where a revenue will be derived from them.

SUMMARY OF TOTAL AMOUNT EXPENDED IN THE METER DEPARTMENT FOR THE YEARS 1889 TO JULY 1, 1904, INCLUSIVE.

	1889	1890	1891	1892	1893	TOTAL
Meters	$11,175 00	$18,700 00	$6,501 55	$12,871 82	$6,987 43	$ 55,785 80
Supt. and labor	1,734 10	8,510 57	4,841 49	8,269 17	8,980 48	32,335 81
Material, tools, etc	637 26	2,982 14	872 99	2,182 98	1,650 33	8,275 65
Freight, hauling, etc	98 05	408 97	197 11	244 08	165 12	1,113 33
Horses, wagon, etc	....	....	....	547 24	184 50	731 74
Aggregate	$13,644 41	$30,601 68	$12,413 14	$23,565 24	$17,967 86	$ 98,192 33

	1894	1895	1896	1897	1898	TOTAL
Meters	$8,824 08	$9,235 11	$10,435 76	$7,955 97	$1,790 75	$ 38,241 67
Supt. and labor	6,672 20	6,647 89	6,340 08	6,078 78	4,531 11	30,270 06
Material, tools, etc	1,833 01	1,384 85	1,035 15	927 90	568 99	5,749 90
Freight, hauling, etc	201 18	71 40	91 11	67 90	13 16	444 75
Horses, wagon, etc	383 07	248 60	238 51	330 80	187 50	1,388 48
Aggregate	$17,913 54	$17,587 85	$18,140 61	$15,361 35	$7,091 51	$ 76,094 86

	1899	1900-1	1901-2	1902-3	1903-4	TOTAL
Meters	$2,265 70	$4,172 61	$4,801 12	$ 4,316 72	$4,401 82	$ 19,957 97
Supt. and labor	4,223 54	6,369 45	4,597 96	5,319 54	5,144 01	25,654 50
Material, tools, etc	375 32	617 71	521 69	577 61	360 45	2,452 78
Freight, hauling, etc	6 85	15 00	1 60	3 37	59	27 41
Horses, wagon, etc	244 25	321 15	220 10	238 00	473 30	1,496 80
Aggregate	$7,115 66	$11,495 92	$10,142 47	$10,455 24	$10,380 17	$223,876 65

Inspection.

A portion of the work done in this department is shown in the following statement.

New connections examined—City	2,300
" " " Hamtramck	124
" " " Highland Park	17
Extensions examined	833
Buildings examined	6,855
Fixtures inspected	5,665
Let on vacant, re-occupied	305
Let on non-payment	295
Let on new connections	1,990
Building tax notices	4,349
Delinquents notified	23,685
Shut off for non-payment	375
Shut off for vacancy	504
Shut off for leaks	337
Inquiries for collectors	6,833
Meters read	28,591
Meter bills delivered	19,742
Examination for leaks	29,307
Leaks reported	2,952
Total	135,059

Service Cocks.

Twenty three hundred service cocks were inserted during the year, being 50 less than the previous year. There were 109 abandoned, nearly all being replaced by larger taps. The total now in use being 66,226, which number includes adjoining villages.

TABLE showing the number and sizes of taps inserted in each ward from July 1, 1903, to July 1, 1904.

INSERTED.	WARDS.																	Total.
SIZES.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
⅝-inch	52	7	65	30	94	38	40	54	106	61	92	126	169	157	121	290	312	1,814
1-inch	70	33	17	23	17	25	10	20	12	16	16	16	17	36	37	20	37	422
2-inch	6	7	1	3	2	2	...	...	1	1	2	...	1	...	1	2	...	29
3-inch	4	9	...	1	...	...	1	...	1	...	...	...	...	...	...	1	...	17
4-inch	1	1	...	2	...	...	1	...	1	...	...	...	...	1	1	1	...	9
6-inch	3	3	...	...	...	1	...	...	...	...	1	...	...	...	...	...	...	8
8-inch	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1
10-inch	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Aggregate	136	60	83	59	113	66	52	74	121	78	111	142	187	194	161	314	349	2,300
DISCONTINUED.																		
⅝-inch	3	15	10	12	16	5	8	1	1	...	3	1	3	10	2	3	...	93
1-inch	...	4	...	1	1	...	...	...	2	...	...	...	...	4	...	3	...	15
4-inch	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Aggregate	4	19	10	13	17	5	8	1	3	...	3	1	3	14	2	6	...	109

TABLE showing the total number of service connections in the villages of Highland Park, Delray, River Rouge, Woodmere and Hamtramck, July 1, 1904. Also total consumption in each and the consumption at Belle Isle Park.

	IN USE JULY 1, 1903.						INSERTED IN 1903-4.						TOTAL.	TOTAL CONSUMPTION.
	⅝-in.	1-in.	2-in.	3-in.	4-in.	6-in.	⅝-in.	1-in.	2-in.	3-in.	4-in.	6-in.		Gallons.
Highland Park............	54	49	1	1	.....	.....	15	2	.....	.....	.....	1	123	21,228,512
Delray............................	821	88	6	3	1	4	149	10	.....	.....	.....	....	1,082	187,349,612
River Rouge.	293	6	.....	.....	1	....	103	4	.....	.....	.....	...	407	33,042,866
Woodmere	355	27	1	.....	1	....	279	6	.....	.....	....	.....	669	65,663,885
Hamtramck	158	5	.....	.....	2	.....	120	3	1	.....	....	.....	289	45,978,940
Aggregate..............	1.681	175	8	4	5	4	666	25	1	.....	.....	1	2,570	353,263,815

Consumption Belle Isle Park, 1903-04.................................... 234,986,711

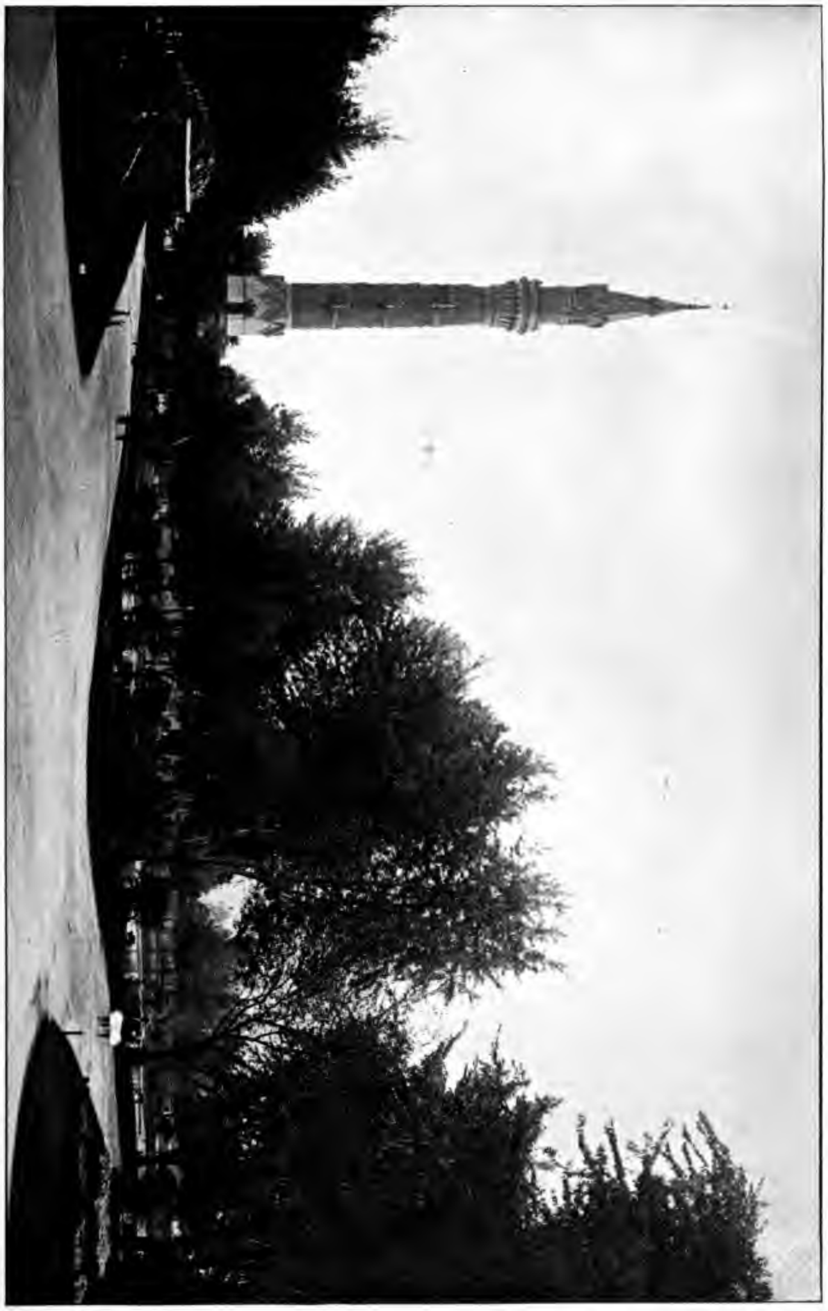
TABLE SHOWING THE TOTAL NUMBER OF SERVICE CONNECTIONS IN THE CITY AND ADJOINING VILLAGES, JULY 1ST, 1904.

SIZES.	In Use July 1, 1903.	Added 1903–4	Discontinued 1903–4.	Total.
⅝ inch	45,132	1,814	93	46,853
1 "	15,498	422	15	15,905
2 "	419	29	....	448
3 "	223	17	....	240
4 "	151	9	1	159
6 "	41	8	....	49
8 "	....	1	....	1
10 "	1	....	....	1
Total, City	61,465	2,300	109	63,656
" Villages	1,877	693	....	2,570
Aggregate	63,342	2,993	109	66,226

Attached to this report is a complete list of tools on hand and an itemized account of material in stock in the meter and inspection departments on the first day of July, 1904.

All of which is respectfully submitted,

T. R. PUTNAM,
Supt. Meters and Inspection.



REPORT OF CHIEF ENGINEER AT PUMPING WORKS.

Detroit, July 1, 1904.

To the Board of Water Commissioners:

Gentlemen—I have the honor to submit the Engineer's report for the year ending June 30, 1904.

The following table shows the number of gallons of water pumped, and cost of fuel for the years named:

YEAR.	GALLONS OF WATER PUMPED.	COST OF FUEL CONSUMED.	AVERAGE DAILY DELIVERED.
1852	235,840,271		646,411
1853	303,531,743	$ 2,129 37	931,594
1854	376,265,126	2,271 34	1,030,866
1855	542,807,364	3,325 81	1,487,143
1856	692,124,305	4,017 44	1,896,231
1857	697,190,523	3,993 20	1,909,837
1858	718,091,207	3,655 20	1,967,373
1859	782,112,587	3,194 15	2,142,774
1860	870,036,451	4,196 21	2,383,580
1861	895,129,423	4,414 07	2,452,409
1862	994,945,829	3.150 95	2,725,878
1863	1,035,798,043	4,670 86	2,837,808
1864	1,018,390,256	7,647 62	2,839,078
1865	1,049,514,887	7,372 89	2,875,383
1866	1,196,317,922	9,349 16	3,277,583
1867	1,425,535,230	10,121 82	3,905,576
1868	1,666,545,125	11,379 23	4,507,248
1869	1,946,810,325	11,247 92	4,511,809
1870	1,866,060,068	12,713 78	5,112,493
1871	2,300,150,605	14,681 05	6,301,782
1872	2,782,292,578	17,736 86	7,601,392
1873	3,198,393,948	20,233 30	8,762,723
1874	3,289,872,635	20,431 71	9,013,350
1875	4,207,454,260	21,393 98	11,527,272
1876	4,065,134,470	19,832 89	11,107,499
1877	4,218,239,790	17,433 72	11,543,123
1878	4,345,743,330	10,943 82	11,906,146
1879	5,129,599,110	11,219 51	14,053,696
1880	5,552,965,310	12,276 60	15,172,036
1881	6,543,127,968	16,556 63	17,926,377
1882	6,284,000,742	13,156 16	17,261,440
1883	7,379,327,188	16,495 99	20,217,334
1884	8,510,614,140	19,877 07	23,253,044
1885	9,970,829,580	21,341 48	27,317,341
1886	10,576,571,254	20,387 24	28,976,907
1887	13,168,859,808	35,882 83	36,079,166
1888	14,380,166,670	39,568 66	39,397,716
1889	12,875,334,453	34,413 31	35,274,888
1890	12,120,944,532	31,852 40	33,209,067
1891	12,057,261,236	33,826 86	33,033,592
1892	12,476,612,482	31,034 40	34,182,499
1893	13,877,977,208	27,479 93	38,021,855
1894	13,649,779,605	29,283 47	37,396,656
1895	14,698,451,954	32,095 00	40,269,731
1896	13,254,369,371	31,186 17	36,215,123
1897	12,928,821,326	17,355 58	35,421,428
1898	14,278,682,058	17,880 19	39,092,252
1899	16,348,062,701	19,011 67	44,789,212
1900	17,077,100,477	25,398 50	46,786,576
January 1 to July 1, 1901	8,849,732,755	16,881 31	48,893,551
July 1, 1901, to July 1, 1902	18,333,104,706	24,830 79	50,200,204
July 1, 1902, to July 1, 1903	18,757,682,360	26,909 99	51,390,911
July 1, 1903, to July 1, 1904	21,734,954,234	38,461 08	59,385,121

The following tables show in detail the work done by each engine each month of the year:

ENGINE No. 1.

MONTHS.	Time run. H.	Time run. M.	Revolutions.	Gallons Pumped.
July	309	45	186,788	234,902,568
August	410	50	245,819	321,621,402
September	568	15	345,532	474,729,732
October	556	50	332,365	459,042,660
November	255	40	150,084	174,098,754
December	208	40	127,353	142,164,144
January	439	50	265,937	349,863,132
February	590	25	358,350	461,632,260
March	564	05	348,571	535,209,426
April	575	....	352,930	523,978,560
May	550	30	336,635	484,683,570
June	642	....	391,340	520,808,460
Total	5,671	50	3,441,704	4,682,734,668

ENGINE No. 2.

MONTHS.	Time run. H.	Time run. M.	Revolutions.	Gallons Pumped.
July	517	30	339,450	505,229,760
August	552	45	351,010	485,968,560
September	337	10	217,693	262,417,128
October	36	....	23,820	25,701,840
November	312	05	201,106	241,421,496
December	659	30	425,841	600,086,736
January	580	40	374,415	591,723,720
February	396	40	257,997	401,557,536
March	366	25	241,982	331,457,376
April	558	15	353,035	468,521,880
May	332	50	217,010	281,691,480
June	......	....	....	....
Total	4,649	50	3,003,359	4,195,777,512

ENGINE No. 3.

MONTHS.	Time run. H.	Time run. M.	Revolutions.	Gallons Pumped.
July	643	40	412,074	702,205,196
August	596	35	375,594	662,380,500
September	494	38	312,300	547,995,010
October	595	15	366,872	601,426,678
November	392	25	242,333	426,969,052
December	16	15	8,987	8,214,118
January	355	30	213,774	264,430,986
February	335	10	216,925	307,276,970
March	250	20	157,485	143,941,290
April	......	....	....	....
May	16	15	9,610	8,783,540
June	212	25	135,275	123,641,350
Total	3,908	28	2,451,229	3,807,264,690

ENGINE No. 4.

MONTHS.	Time run.		Revolutions.	Gallons Pumped.
	H.	M		
July	519	50	479,534	376,434,190
August	332	55	301,065	236,336,025
September	420	15	387,979	204,563,515
October	659	....	581,610	456,563,850
November	588	....	509,710	400,122,850
December	479	55	429,980	337,534,300
January	257	....	233,520	183,313,200
February	673	....	625,523	491,035,555
March	692	30	655,050	514,214,250
April	118	40	112,710	88,477,350
May	394	45	382,230	300,050,550
June	710	15	661,955	519,634,675
Total	5,846	05	5,360,866	4,208,279,810

ENGINE No. 5.

July	......	....	....	....
August	11	40	11,340	11,090,520
September	11	97	12,008	11,743,824
October	......	....	....	....
November	247	45	224,827	219,880,806
December	404	....	371,222	363,055,116
January	220	....	200,820	196,406,850
February	353	30	326,325	319,145,850
March	388	40	362,655	354,676,590
April	318	15	280,225	274,060,050
May	408	....	296,994	290,460,132
June	362	05	330,024	322,763,472
Total	2,726	32	2,416,445	2,363,283,210

ENGINE No. 6.

July	......	....	....	....
August	......	....	....	....
September	......	....	....	....
October	42	20	42,264	41,334,192
November	15	....	14,397	14,080,266
December	313	50	297,091	290,554,998
January	524	....	477,176	466,678,128
February	342	30	316,533	309,569,274
March	355	20	334,395	327,033,420
April	401	45	354,080	346,290,240
May	336	....	371,480	363,307,440
June	357	55	325,937	318,766,386
Total	2,688	40	2,533,348	2,477,614,344

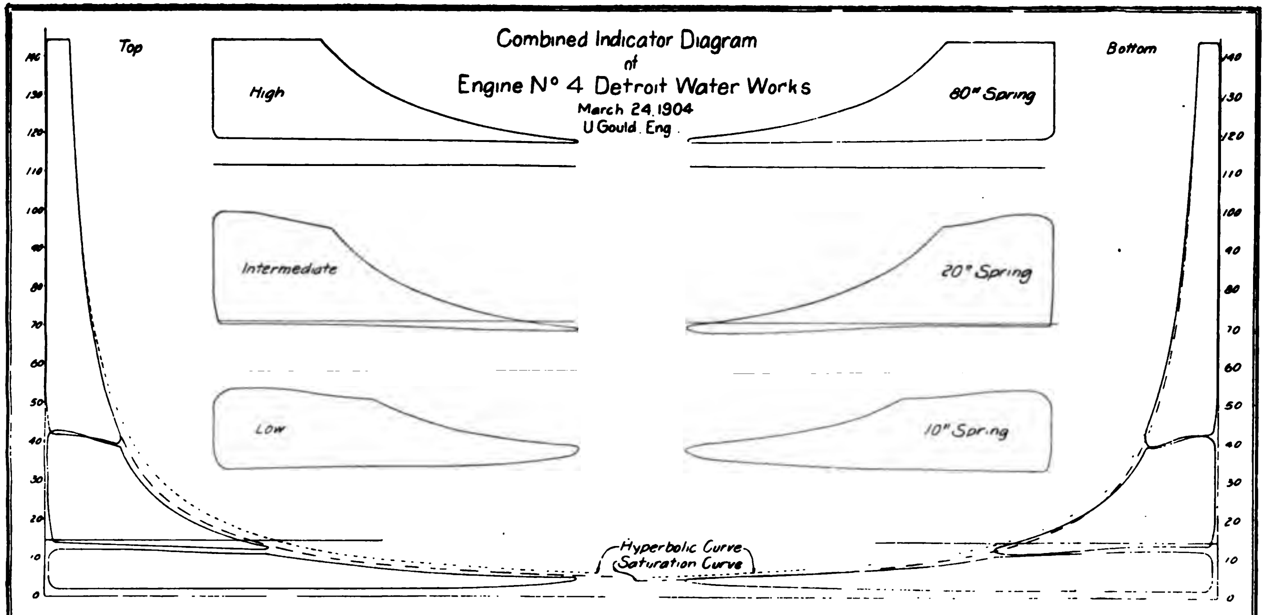
TOTAL EXPENSES PUMPING WATER, 1903-1904.

Fuel coal consumed	$38,461 08
Salaries	31,703 60
Repairs boiler and engine	1,212 14
Engine oil and grease	421 99
Waste and rags	363 08
Boiler and engine supplies	259 34
Packing and hose	288 16
General supplies, engine and boiler	170 96
Electric light fixtures and supplies	117 79
Ice	40 00
Paint, lead and glass	27 77
Printing and stationery	24 90
Horse expense	13 75
Miscellaneous	12 25
Kerosene and gasoline	22 00
Boiler inspection	36 00
Telephone	66 00
Hospital service	160 00
Freight charges	4 29
Feed and bedding, horse	43 17
Street car tickets	4 00
Total	$73,452 22

The cost of fuel per million gallons pumped was $1.76, and per million gallons pumped 100 feet high was $1.43. The table shows that the amount of water pumped during the year was 21,734,954,234 gallons, making the daily average 59,385,121, which is an increase of 15 per cent compared with the preceding year. The excessive cold weather of the past winter has increased the amount of water pumped considerable, as the table plainly shows.

The total expense during the year for pumping water, including maintenance, heating station, library and greenhouse, hoisting coal, etc., was $73,452.22, thus making the cost per million gallons pumped $3.37.

The station duty of coal consumed for all purposes for the year was 80,048,805 foot pounds.



Combined Indicator Diagram of Engine N° 4 Detroit Water Works

March 24. 1904

U Gould. Eng.

Data

Diameter of high pressure cylinder	28"	Length of stroke	5
Diameter of intermediate cylinder	48	Clearance of high pressure cylinder	19%
Diameter of low pressure cylinder	74"	Clearance of intermediate cylinder	15%
Diameter of piston rods 2 for each cylinder	4	Clearance of low pressure cylinder	8%

The engines are in a fair condition, but the foundation of No. 2 will require some extensive repairs in the near future.

The indicator cards were taken from the 24,000,000 gallon triple expansion pumping engine which was installed in 1893 and received but minor repair during that time, but will require more attention in the future as it deserves.

The two new 25,000,000-gallon triple expansion pumping engines were started in August and October respectively and one of them has been in constant use since November, 1903. They started on the year of probation January, 1904, during which time the official test is to be run, but has not been run to date. The engines are doing as well as could be expected, pumping into the high service pipes carrying from 60 to 70 pounds pressure per square inch, which gives satisfactory service to the high district.

The boilers are all in good working order, having put in new tubes where required and rebuilt arches on several furnaces. We also put in an independent feed pipe line from the new engines to the lower drum of the vertical boilers by utilizing the lower drums as a purifier below the fire line; we find that the tubes are much cleaner.

The engine house is in good condition with the exception of the roof, which is in need of slight repairs.

The boiler rooms are in satisfactory condition.

The coal shed roofs are undergoing repairs at present. The new ventilators which are now being put on will be a much needed improvement.

Respectfully submitted,

URIAH GOULD,
Chief Engineer.

REPORT OF THE SUPERINTENDENT OF CONSTRUCTION.

To the Honorable Board of Water Commissioners:

Gentlemen—I respectfully submit the report of the Supt. of Construction for the year ending June 30th, 1904.

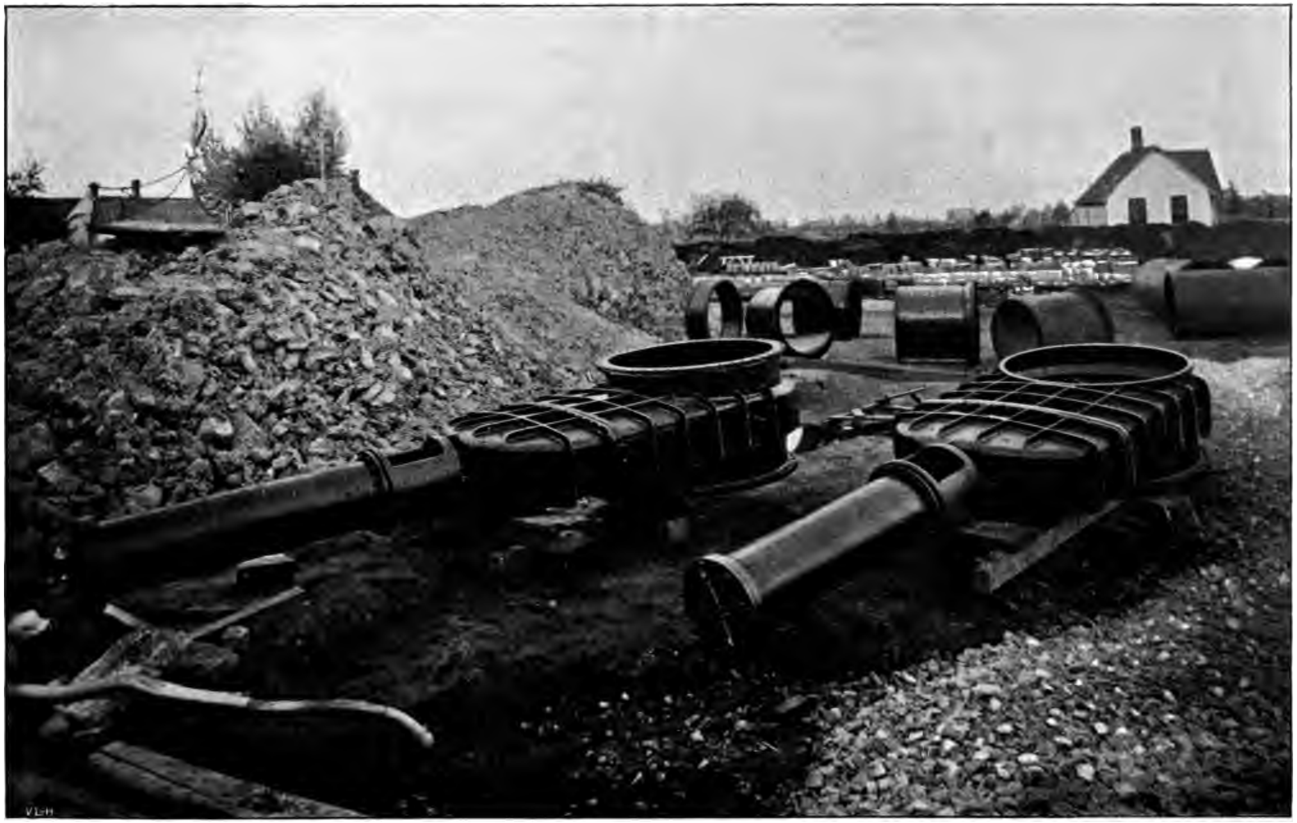
Statement of the work performed at the Pumping Station from July 1st, 1903 to July 1st, 1904.

10 foot Conduit, building 90 ft. 6 in. and work on shore shaft	$ 3,619 79
Laying 1735 ft. of 6-in. pipe and 26 ft. of 12-in. to the river for fire protection to the 10-ft. Conduit	1,728 21
8-ft. Conduit, building 278 ft. 4 in	6,196 07
7-ft. Conduit, building 86 ft. 2 in	1,653 50
Old 6-ft. Conduit, rebuilding same	4,584 69
Old 5-ft. Conduit, rebuilding 10 ft	417 08
Emergency Inlet, work thereon	3,598 51
Basin Inlet No. 1, work thereon	236 77
Basin Inlet No. 2, work thereon	212 73
Basin Inlet No. 3, work thereon	3,270 15
Center Inlet, work thereon	24 50
Junction Well No. 6, work thereon	1,772 72
Junction Well, 21 foot, work thereon	3,975 36
Subterranean Well, work thereon	162 88
Strainer Well No. 2, work thereon	51 25
Strainer Well No. 5, work thereon	631 58
Strainer Well No. 6, work thereon	17 50
Concreting and work on coal sheds, etc	2,513 65
Labor on R. R. track and buildings	957 77
Lowering Steam Pipes and setting Hydrants on grounds	1,609 12
Repairing leak in 42-in. main in station grounds	197 97
Pumping water from Wells and Basins	3,389 14
	$40,820 94

Distribution System.

Pipe laid outside of the city during the past year was as follows:

Village of Delray	1,985	feet.
Village of River Rouge	5,715	"
Village of Woodmere	4,836	"
Village of Hamtramck	46,049	"
Village of Highland Park	6,783	"
Village of Ecorse	23,425	"
	88,793	feet, or $16\frac{4313}{5280}$ miles.



42-INCH GATES.

Inside the city we laid 57,140 feet, and discontinued 1,328 feet, making a net increase inside of the city of 55,812 feet, or $10\frac{3012}{5280}$ miles.

Outside the city we laid 88,793 feet, and discontinued 1,782 feet, making a net increase outside of the city of 87,011 feet, or $16\frac{2531}{5280}$ miles.

The net increase in the entire system is 142,823 feet, or $27\frac{263}{5280}$ miles.

The Board now owns $85\frac{1475}{5280}$ miles outside of city and inside $559\frac{88}{5280}$ miles, making a total of pipe in system of $644\frac{1563}{5280}$ miles of the different sizes, as follows:

Size of Pipe, Inches.	Measured Length in Feet to July, 1903.	Length in Feet Laid from July, 1903, to July, 1904.	Discontinued Feet from July, 1903, to July, 1904.	Total Length in Feet to July, 1904.
45	103	....	....	103
42	74,156	59	....	74,215
36	7,582	29	....	7,611
30	54,547	11	....	54,558
24	84,840	....	....	84,840
20	393	....	....	393
18	87	....	....	87
16	54,302	1,607	....	55,909
12	45,989	7,185	....	53,174
10	172,253	6,115	....	178,368
8	341,183	24,998	....	366,181
6	1,501,594	88,020	2,283	1,587,331
4	854,217	17,904	468	871,653
3	63,221	5	359	62,867
2	4,593	....	....	4,593
Total,	3,259,060	145,933	3,110	3,401,883

At the close of this report will be found a descriptive list of lines of pipe laid, with locations, length, sizes and cost of constructions in detail.

The total number of gates now in system amounts to 7,602 of the different kinds and sizes shown in the following table.

SHUT OFF GATES IN SYSTEM JULY 1st, 1904.

SIZE.	42-IN.	36-IN.	30-IN.	24-IN.	20-IN.	18-IN.	16-IN.	12-IN.	10-IN.	8-IN.	6-IN.	4-IN.	3-IN.	TOTAL.
Murdock	5	...	11	16	...	...	27	47	188	454	1,627	1,314	11	3,700
Flowers	20	...	9	18	...	...	...	...	39	52	245	437	20	840
Galvin	...	1	7	12	...	...	21	...	13	31	170	250	1	506
Michigan Brass and Iron Works	10	...	9	2	11	...	13	11	63	152	776	111	...	1,158
Pittsburg	...	...	...	15	...	2	1	1	10	11	31	119	...	190
Roe Stephens (Scott)	...	...	...	...	...	...	...	6	....	6	43	....	...	55
Eddy	...	...	...	...	...	...	...	...	15	4	6	9	...	34
Scowden	...	...	...	...	...	...	...	...	8	18	48	12	...	86
Ludlow	...	...	...	...	...	...	...	...	1	2	9	5	...	17
St. Louis	...	...	...	...	...	...	...	3	....	....	....	....	...	3
Detroit Water Works	8	3	3	4	...	...	5	13	42	106	554	227	...	965
Prong	...	...	...	...	..	...	...	...	....	....	1	....	...	1
Boston	...	...	...	...	...	...	...	...	....	1	1	....	...	2
Newport	...	...	...	...	...	...	...	...	....	....	....	1	...	1
Name Unknown	...	..	...	...	...	...	...	...	....	8	9	32	1	45
TOTAL	43	4	39	67	11	2	67	81	379	840	3,520	2,517	33	7,603

GATES SET FOR SHUT-OFFS FROM JULY, 1903, TO JULY, 1904.

NAME.	SIZES.						
	4-in.	6-in.	8-in.	10-in.	12-in.	16-in.	TOTAL.
Detroit Water Works—City	17	75	18	13	6	4	133
Flowers—City	1	....	....	....	....	....	1
Scott—City	....	....	1	....	....	....	1
Detroit Water Works—Ecorse	5	16	12	....	....	...	33
Scott—Ecorse	....	....	1	...	....	...	1
Mich. Brass and Iron Works—Ecorse	..	....	1	. ..	....	....	1
Detroit Water Works—Hamtramck	13	30	6	....	....	....	49
Detroit Water Works—Highland Park	...	6	1	....	....	....	7
Detroit Water Works—River Rouge	4	2	..	....	....	....	6
Detroit Water Works—Woodmere	...	1	....	. .	....	....	1
Detroit Water Works—Delray	1	4	....	1	....	....	6
Total	41	134	40	14	6	4	239

SHUT-OFF GATES DISCONTINUED FROM JULY, 1903, TO JULY, 1904.

NAME.	SIZES.			
	4-in.	6-in.	8-in.	TOTAL.
Murdock	6	3	1	10
Galvin	3	1	......	4
Scowden	.....	......	1	1
Pittsburg	3	......	......	3
Total	12	4	2	18

TOTAL AND AVERAGE COST OF WELLS BUILT OVER GATES.

OVER GATES IN OLD LINES.		Average.
5 gate wells, 10", 12" and 16"	$225 10	$45 02
31 gate wells, 4", 6" and 8"	951 71	30 70
1 gate well, 3"	32 93	32 93
37	$1,209 84	
OVER GATES IN NEW LINES.		**Average.**
24 gate wells, 10", 12" and 16"	$ 684 35	$28 51
264 gate wells, 4", 6" and 8"	6,181 97	28 41+
288	$6,866 32	

The following is a statement of examinations, operations and repairs of gates, etc.

6,123	gates examined.
163	gates repaired.
6,227	gates operated for flushing dead ends.
28	gate key extensions for large gates.
112	gate boxes adjusted.
75	tees set for fire department.
3,167	wells in system.

LEAKS IN MAINS FROM JULY, 1903, TO JULY, 1904.

SIZES.	COST.
4 inch, 6 inch and 8 inch	$1,139 61
10 inch, 12 inch and 16 inch	73 81
24 inch, 30 inch and 42 inch	1,382 67
	$2,596 09

LEAKS IN SERVICE CONNECTIONS.

MONTHS.	NO.	COST.
1903		
July	28	54 35
August	35	110 76
September	18	53 19
October	20	78 70
November	18	69 15
December	18	48 91
1904		
January	36	104 60
February	81	368 65
March	102	325 30
April	108	577 54
May	90	361 90
June	47	213 50
Total	601	$2,366 55

COMPLAINTS.

MONTHS.	COMPLAINTS.			SERVICE.	
	No Water.	Bad Water.	Short Supply	Let On.	Shut Off.
1903					
July	7	18	7	1	7
August	3	5	1	3	4
September	7	4	12	......	9
October	7	12	4	2	10
November	6	......	1	5	20
December	1	2	......	1	7
1904					
January	5	......	2	2	......
February	62	......	2	2	.1
March	6	......	5	5	2
April	6	3	3	7	4
May	16	9	3	2	12
June	4	......	7	7	......
Total	130	53	47	37	76

PIPE LAID FROM JULY 1st, 1803, TO JULY 1st, 1904—CONTINUED.

Date.	LOCATION OF PIPE.	Feet.	Size.	COST OF CONSTRUCTION.											
				Pipe.	Specials.	Lead.	Gates.		Sundries.	Gate-wells.	Hauling.	Repaving.	Sup. & Eng.	Labor.	Total Cost.
							No.	Cost.							
May 5, 1904	Goodwin, from 34 ft. s of n of Holbrook to 773 ft. n of n of same	807	6 in	$340 31	$18 58	$32 89	....	$26 00	$3 12	$21 29	$8 38	.....	$40 35	$278 76	$769 68
July 8, 1903	Hancock, from 3½ ft. e of e of Twenty-fourth to 32 ft. e of w of Twenty-third street	322	4 in.	96 08	1 32	9 79	....	....	1 54	....	2 00	.....	16 10	92 57	219 40
July 27, 1903	Harper, from 26 ft. e of w of Helen to 131 ft. e of e of Currie	365	6 in.	176 29	13 92	15 66	....	26 00	1 31	19 89	2 75	.....	18 25	132 01	406 08
Oct. 6, 1903	Holbrook, from w line of Mt. Elliot to 172 ft. w of e of Saginaw	661	6 in.	327 62	13 16	19 58	....	26 00	1 70	22 49	12 30	.....	33 05	192 04	647 94
Oct. 22, 1903	Haigh, from 22 ft. e of w of St. Aubin to 20 ft. w of e of Fordyce	318	6 in.	157 61	5 91	10 96	....	14 50	66	21 17	3 75	.....	15 90	63 68	294 14
Nov. 14, 1903	Harper, from 3 ft. e of e of Mt. Elliot to 727 ft e of same, also from e line of Mt. Elliot for connection with 12 in. line	730 25	12 in. 6 in.	770 14	24 40	62 12	....	14 50	2 58	....	22 90	.....	37 75	339 10	1,273 49
May 4, 1904	Hudson, from e line of Greenwood	125	6 in.	52 70	7 61	5 48	....	11 50	73	....	5 50	.....	6 25	48 89	138 66
May 10, 1904	Haigh, from 315 ft. e of e of Greeley to 390 feet e of same	75	6 in.	31 62	....	3 65	....	....	38	....	3 75	.....	....	27 65	67 05
May 19, 1904	Hooker, from 134 ft. e of e of Grand River to 279 ft. e of e of same	145	6 in.	61 14	3 93	4 35	....	....	76	....	4 50	.....	7 25	47 96	129 89
June 1, 1904	Helene, from 3 ft. e of e of Woodward to 1,035 ft. w of w of Second, also in Woodward from 23 ft. n of s of Helene to 147 ft. s of s of same	1,956 184	6 in. 6 in.	902 41	8 76	65 77	....	40 50	21 74	42 54	19 17	.....	107 00	605 74	1,813 63
May 11, 1904	Ironsides, from 41 ft. w of e of Military to 322 ft. e of e of same	364	6 in.	153 49	17 93	14 62	....	26 00	2 25	20 58	7 88	.....	18 20	177 15	438 10
Nov. 24, 1903	Julia, from w line of Junction to 30 ft. w of e of Greusel	370	6 in.	156 02	6 08	12 79	....	14 50	1 93	20 64	8 38	.....	18 50	118 54	357 38
May 4, 1904	John R, from 8 ft. n of s of Adams to 6 ft. n of n of Madison, also from 6 ft. n of n of Madison to 51 ft. n of s of Miami	287 578	8 in. 10 in.	602 50	69 92	40 19	....	118 15	14 69	85 24	46 44	.....	43 00	637 23	1,657 36
May 4, 1904	Jefferson, alley n of, from 17 ft. w of e of Seyburn to 37 ft. e of w of Van Dyke	647	6 in.	312 68	9 58	25 45	...	29 00	3 90	40 12	5 00	.....	32 35	268 35	726 82
July 8, 1903	King avenue, from 250 ft. w of w of Cameron to 313 ft. w of w of same	63	6 in.	30 50	....	2 83	....	....	36	....	1 25	.....	....	15 25	50 19

July 8, 1903	Kanter, from 19 ft. w of e of Moran to 303 ft. e of e of Ellery..........	805	6 in.	$388 88	$5 38	$27 41	....	$14 50	$2 09	$19 91	$6 25	.....	$40 25	$943 57	$748 24
July 25, 1903	Kercheval, from 19 ft. w of e of Crane to 21 ft. e of w of Fisher....	420	8 in.	288 23	13 57	15 66	....	32 00	2 58	21 00	3 25	.....	21 00	157 33	554 62
Dec. 23, 1903	Lafayette, from 28 ft. e of w of Scotten to 318 ft. w of w of same..	346	6 in.	145 90	6 43	14 62	....	14 50	2 65	15 39	5 85	.....	17 30	216 97	439 61
Apr. 27, 1904	Lafayette, from 318 ft. w of w of Scotten to 19 ft. w of e of Clark...	725	6 in.	94 87	6 80	10 96	....	14 50	2 12	....	5 50	. . .	11 25	76 36	-222 86
May 25, 1904	Lafayette, from 17 ft. e of w of Vinewood to w line of Boulevard......	363	6 in.	158 07	6 37	15 23	....	14 50	2 54	20 90	5 38	.....	18 15	83 40	319 54
July 27, 1903	Meldrum, from 375 ft. s of s of Berlin to 792 ft. s of s of same.........	417	6 in.	201 30	....	13 70	....	....	65	....	3 50	.....	20 85	100 12	340 12
July 27, 1903	McClellan, from 15 ft. n of Gratiot to 397 ft. s of s of same; thence to 4 ft. s. of n of Medbury....	412 483	10 in. 6 in.	599 33	35 00	39 15	....	57 15	2 09	40 00	15 00	....	44 75	387 01	1,219 48
Aug. 20, 1903	Mack, from 20 ft. e of w of Hurlbut to 12 ft. e of w of Cadillac.........	334	6 in.	165 54	5 07	7 83	....	....	9 32	....	14 75	.....	16 70	734 71	953 92
Oct. 5, 1903	Milwaukee, from 9 ft. 6 in. w of e of Collins to 11 ft. 6 in. e of e of same	21 4	12 in. 8 in.	27 97	100 75	18 27	....	....	2 20	....	4 44	.....	....	113 45	267 18
Nov. 14, 1903	Mt. Elliot, from 20 ft. s of n of Milwaukee to 1,298 ft. s of same, also in Mt. Elliot from n line of Harper to 105 ft. n of same...............	1,298 105	12 in. 4 in.	1378 54	83 62	102 31	....	130 00	13 04	61 50	38 94	.....	70 15	820 55	2,698 65
Nov. 3, 1903	Milwaukee, from 12 ft. e of e of Collins to 11 ft. w of e of Mt. Elliot...	1,741	12 in.	1,960 04	33 07	109 62	....	52 00	12 36	23 03	53 93	....	87 05	872 05	3,203 15
Nov. 26, 1903	Mack, from 13½ ft. e of e of Collins, also in Collins from 2 ft. s of n of Mack............................ also from 4 ft. w of n of Collins in Mack to 26 ft. e of w of same......	29′ 10″ 29 29	42 in 42 in. 36 in.	690 83	380 61	83 39	....	......	88 63	....	60 63	.....	....	1,206 84	2,510 93
Dec. 31, 1903	Michigan avenue "Subway," lowered 969 ft. of old pipe and laid new pipe on "M. C. R. R."............	220 13	6 in. 4 in.	96 10	56 95	21 92	....	11 50	138 96	....	36 18	.....	48 45	2,309 73	2,719 79
Jan. 8, 1904	Mack, from 12 ft. w of e of Cadillac to 21 ft. 6 in. w of e of same for B. O. to sewer..........	14	6 in.	5 90	4 13	1 83	....	....	4 35	....	4 24	....	....	86 96	107 41
Mar. 16, 1904	Mullet Crossing Rivard for B. O. to sewer............................	25	8 in.	6 33	9 38	3 65	....	23 00	5 21	69 12	19 95	.....	....	119 78	256 42
May 9, 1904	Madison, from 12 ft. e of w of Wilcox to 11 ft. e of w of John R..	354	8 in.	206 69	....	18 27	....	32 00	2 12	21 63	10 75	....	17 70	188 77	497 93
May 16, 1904	Medbury, from 27 ft w of e of Field to 25 ft. e of w of Sheridan........	299	6 in.	126 03	8 42	14 62	....	14 50	2 22	21 29	5 61	.....	14 95	92 09	299 78
May 24, 1904	Milwaukee, from 20 ft. e of w of Fourteenth street to 185 ft. w of same..........	205	6 in.	86 44	3 38	7 31	....	26 00	2 70	21 29	6 58	.....	10 25	65 84	229 79
May 27, 1904	Meldrum, from 225 ft. s of s of Charlevoix to 275 ft. s of s of same	50	6 in.	21 08	....	1 74	....	....	18	....	1 88	.....	....	20 15	45 03

PIPE LAID FROM JULY 1st, 1903, TO JULY 1st, 1904—CONTINUED.

Date.	LOCATION OF PIPE.	Feet.	Size.	COST OF CONSTRUCTION.											
				Pipe.	Specials.	Lead.	Gates.		Sundries.	Gate-wells.	Hauling.	Re-paving.	Sup. & Eng.	Labor.	Total Cost.
							No.	Cost.							
Oct. 1903 to June 1904	Michigan avenue "Subway," for L. S. & M. S. R. R. and G. T. R. R. lowered 1,214 ft. of old pipe and laid new pipe....................	146 73	6 in. 4 in	$80 03	$17 97	$14 62	...	$40 50	$117 07	$69 15	$28 50	.....	$73 15	$2,993 08	$3,434 07
July 8, 1903	Olds Motor Works, private way.....	472 21 3′ 10″	8 in. 6 in. 4 in.	369 05	199 77	90 53	....	76 45	6 99	278 39	22 16	.....	24 85	450 04	1,518 23
Nov. 24, 1903	Ottawa, e of Thirteenth street......	5	3 in.	91	86	44	....	....	04	....	1 00	.....	....	7 37	10 62
	Owen, from 23 ft. w of e of Oakland to 133 ft. w of same................	156	6 in.	65 78	87	5 48	....	14 50	54	21 18	5 37	.....	7 80	35 35	156 97
Nov. 30, 1903	Oakland, from 23 ft. s of n of Josephine to 37 ft. n of s of same..	313	10 in.	237 95	13 53	27 41	....	42 65	2 43	22 01	7 01	.....	15 75	171 55	540 29
July 8, 1903	Palmer, from 35 ft. w of e of Rivard to 379 ft. w of same..	414	6 in.	199 93	4 11	17 40	....	26 00	97	20 51	4 88	.....	20 70	131 10	425 60
Oct. 6, 1903	Pleasure, from 91 ft. n of n of Dry Dock to 152 ft. n of n of same.....	61	4 in.	18 14	....	1 74	....	....	08	....	2 75	.....	....	19 62	42 33
Nov. 24, 1903	Palmer, from 7 ft. e of Collins to 72 ft. e of e of same..............	65	6 in.	27 41	8 31	3 65	....	11 50	89	....	8 35	.....	....	26 06	86 17
Dec. 3, 1903	Palmer, from 25 ft. e of n of Concord to 25 ft. e of n of Bellevue........	387	6 in.	168 18	6 13	14 62	....	14 50	83	20 68	14 00	....	19 35	100 43	353 76
May 16, 1904	Pennsylvania, from 612 ft. s of s of Mack to 1,050 ft. s of s of same....	438	6 in.	184 70	....	14 62	....	....	1 52	....	5 13	.....	21 90	137 39	365 26
July 25, 1903	Rogers, from 23 ft. e of w of Junction to 213 ft. w of w of same......	236	6 in.	114 68	9 33	13 70	....	14 50	6 09	20 01	3 25	.....	11 80	87 40	280 76
July 25, 1904	River, from 20 ft. e of w of Twenty-first street to 263 ft. w of w of same and over Twenty-first street s of n of River to n line of same	289 26	12 in.	378 20	30 19	39 15	....	52 00	4 61	20 49	9 75	.....	15 75	562 56	1,112 70
Sept. 18, 1903	Robey, from 305 ft. n of Ferry to 970 ft. n of n of same.	665	4 in.	197 76	....	19 58	....	....	1 03	....	5 25	.....	33 25	125 15	382 02
Aug. 31, 1903	River, from 17 ft. w of e of Sixth street to 18 ft. w of e of Second, also from 1 ft. n of n of River in Sixth street to 20 ft. s of n of same	1,607	16 in.	3,124 60	222 51	190 00	....	455 00	293 74	159 59	426 83	.....	80 35	3,898 33	8,850 95
June 21, 1904	Rohns, from end of pipe s of Gratiot to s line of Moffatt; thence to 96 ft. n of n of Forest............ ...	628 1,714	8 in. 6 in.	1086 53	28 21	95 00	....	46 50	6 56	43 64	30 38	.....	116 85	652 72	2,106 39

June 1, 1904	St. Joseph, from e of e of Dubois to 3 ft. w of w of same	56	6 in.	$28 61	$9 80	$7 88	....	$29 00	$2 08	$45 88	$2 75	....	....	$45 21	$166 16
May 16, 1904	Sheridan, from 27 ft. s of s of Medbury to s line of Duncan.	1,482	6 in.	624 96	18 16	65 77	...	26 00	6 10	21 29	19 25	.....	74 10	547 25	1,402 88
Apr. 16, 1904	Stanley, from 10 ft. e of w of Twelfth to 28½ w of e of Wabash	723	10 in.	548 78	50 46	51 16	...	99 80	11 12	61 76	12 47	.....	36 15	692 55	1,564 25
Apr. 26, 1904	St. Aubin, from 290 ft. n of n of Haigh to 662 ft. n of n of same	872	6 in.	156 90	....	10 96	...	....	1 03	....	8 89	.....	18 60	121 79	318 17
Apr. 28, 1904	Sheridan, from s line of Mack to 6 ft. n of s of Charlevoix	1792'9"	6 in.	758 98	26 81	65 77	....	29 00	16 96	38 58	10 48	.....	89 63	820 72	1,853 93
Dec. 25, 1903	Spring, from 30 ft. e of w of Scotten to 28 ft. w of e of Clark	582	6 in.	245 42	12 37	21 92	....	14 50	5 02	15 39	21 88	.....	29 10	393 46	759 06
Nov. 24, 1904	Sidney, from 25 ft. w of w of Cameron to 15 ft. e of same	247	6 in.	104 16	....	9 14	....	14 50	1 80	22 01	9 90	.....	12 35	74 18	248 04
Sept. 12, 1903	Sheridan, from 25 ft. s of n of Waterloo to s line of Charlevoix	940	6 in.	465 89	12 68	36 98	....	29 00	1 67	40 62	16 50	.....	47 00	245 05	895 39
Sept. 18, 1903	Seneca, from 13 ft. s of n of Gratiot to 873 ft. s of same	886 4'10"	8 in. 4 in.	609 45	13 16	39 15	....	43 50	2 02	21 77	9 50	.....	44 30	404 60	1,187 45
July 8, 1903	Scott, connecting 30 in. main with the 30 in. in Chene	11	30 in.	57 95	77 24	17 40	....	....	18 49	....	8 50	....	....	204 77	379 35
July 8, 1903	Thurman, from end of pipe n of Gratiot to 698 ft. n of same	147	6 in.	70 91	....	5 87	....	....	42	....	1 75	....	7 35	51 74	138 04
Oct. 30, 1903	Thirty-first street, from 450 ft. n of n of Devereaux to 550 ft n of n of same	106	6 in.	52 54	....	4 35	....	....	12	....	1 75	.....	5 30	31 18	95 24
Dec. 31, 1903	Theodore, from 21 ft. w of e of Beaufait to 16 ft. of w of Bellevue	373	10 in.	283 12	31 15	32 89	....	58 15	6 16	44 39	18 63	.....	18 65	314 25	807 39
Jan. 6, 1904	Twelfth street, for Farrand Organ Co	14'8"	4 in.	4 09	20 29	8 06	....	25 30	62	....	3 75	....	....	17 87	79 98
Jan. 9, 1904	Twelfth street, from 42 ft. s of n of Boulevard to 29 ft. n of s of Stanley	2,889 4'6" 22'6"	10 in. 8 in. 6 in.	2204 96	218 80	200 97	...	217 95	53 65	207 99	109 88	....	145 35	2,187 85	5,497 40
May 2, 1904	Twenty-eighth street, from 58 ft. s of n of Devereaux to 210 ft. n of n of same	268	6 in.	113 01	5 75	10 96	....	14 50	1 04	21 29	8 50	.....	13 40	96 63	285 08
May 9, 1904	Townsend, from 24 ft. s of n of Waterloo to 12 ft. n of s of Goethe	1,860	8 in.	1,086 01	31 97	80 39	....	75 50	9 10	44 24	14 00	.....	93 00	719 05	2,153 56
Oct. 23, 1903	Van Dyke, from 150 ft. n of n of Waterloo to 25 ft. s of s of Worster.	868	8 in	595 67	23 11	36 54	....	....	7 31	....	21 08	.....	43 40	418 69	1,145 80
July 8, 1903	Wilkins, from 3½ ft. e of e of Beaubien to 4½ ft. w of w of same	48	6 in.	23 18	10 26	6 53	....	29 00	3 00	45 36	1 88	.....	....	55 50	174 74
July 27, 1903	Wellington, from 23 ft. w of e of Russell to 2 ft. e of e of same	25	6 in.	12 40	....	1 30	....	....	78	....	75	.....	....	15 91	31 14
July 27, 1903	Wellington, from 23 ft. w of e of Russell to w line of same	37	6 in.	18 35	....	1 74	....	....	72	....	75	.....	......	15 91	37 47
Sept. 18, 1903	Warren, from 62 ft. e of e of Detloff to 173 ft. e of same	111	6 in.	55 02	....	5 87	....	....	30	....	1 50	.....	5 55	29 33	99 57

PIPE LAID FROM JULY 1st, 1903, TO JULY 1st, 1904—CONTINUED.

Date.	LOCATION OF PIPE.	Feet.	Size.	COST OF CONSTRUCTION.										
				Pipe.	Specials.	Lead.	Gates.		Sundries.	Gatewells.	Hauling.	Repaving.	Sup. & Eng.	Labor.	Total Cost.
							No.	Cost.							
Dec. 19, 1903	Witherell, from 7 ft. s of n of alley n of Adams to 4½ ft. s of s of same, also in alley n of Adams, from 19 ft. w of e of Witherell to 3½ w of w of same	20 45½	8 in. 6 in.	$30 85	$21 79	$9 14	....	$46 40	$18 77	$45 70	$20 01	....	....	$220 72	$418 48
May 6, 1904	Wilcox, from 62 ft. w of e of Miami to 50 ft. n of s of Madison	624	10 in.	473 64	63 79	66 47	....	99 80	11 95	43 98	16 75	....	$31 20	611 97	1,419 55
Apr. 18, 1904	Witherell, from 3 ft. s of s of alley n of Adams to 42 ft. 6 in. e of w of Miami	614	8 in.	358 50	67 80	34 71	....	107 50	19 92	71 07	83 75	.....	30 70	372 26	1,096 21
May 24, 1904	Warren, from 3 ft. e of w of Collins to 100 ft. w of w of same	97	6 in.	40 90	2 88	3 70	....	14 50	1 41	20 58	1 88	....	....	31 74	117 59

SUMMARY OF THE AMOUNT OF PIPE LAID IN THE CITY OF DETROIT AND THE VILLAGES OF RIVER ROUGE, DELRAY, WOODMERE, HAMTRAMCK, HIGHLAND PARK AND ECORSE FROM JULY 1st, 1903, TO JULY 1st, 1904.

LOCATION OF PIPE.	Feet.	Size.	COST OF CONSTRUCTION.									
			Pipe.	Specials.	Lead.	Gates. Cost.	Sundries	Gatewell	Hauling.	Sup. & Eng.	Labor.	Total Cost.
City of Detroit	5	3 in.	$ 38,480 23	$2,909 84	$3,300 06	$3,390 67	$1,161 58	$2,949 96	$1,787 49	$3,060 48	$38,726 52	$95,766 83
	1,629.4	4 in.										
	32,974.9	6 in.										
	7,798	8 in.										
	5,841	10 in.										
	7,185	12 in.										
	1,607	16 in.										
	11	30 in.										
	29	36 in.										
	58.10	42 in.										
Total	57,188.11											
Village of River Rouge	3,340	4 in.	2,151 17	42 77	170 32	135 50	10 54	153 50	54 00	285 75	867 75	3,871 30
	2,375	6 in.										
Total	5,715											
Village of Delray	580	4 in.	921 88	94 56	96 49	143 65	10 28	91 87	56 88	99 40	527 81	2,042 82
	1,129	6 in.										
	276	10 in.										
Total	1,985											
Village of Woodmere	4,273.6	4 in.	1,111 47	64 67	152 77	49 00	11 25	67 51	93 04	239 80	901 64	2,691 15
	562	6 in.										
Total	4,835.6											
Village of Hamtramck	6,034	4 in.	22,431 76	461 99	1,576 74	960 50	96 08	962 09	528 31	2,291 21	8,820 55	38,129 23
	33,303	6 in.										
	6,712	8 in.										
Total	46,049											
Village of Highland Park	6,005	6 in.	2,986 47	424 92	248 08	129 00	36 94	158 63	200 06	338 00	1,831 80	6,353 90
	778	8 in.										
Total	6,783											
Village of Ecorse	2,044	4 in.	9,455 40	272 86 Hydrants 845 00	977 19	785 50	110 27	718 45	Cartage and Transportation. 362 18	1,163 65	5,929 02	20,619 52
	11,671	6 in.										
	9,710	8 in.										
Total	23,425											

Total feet laid.............................145,933, or $27\frac{3373}{5280}$ miles.

Total cost, $169,474 75

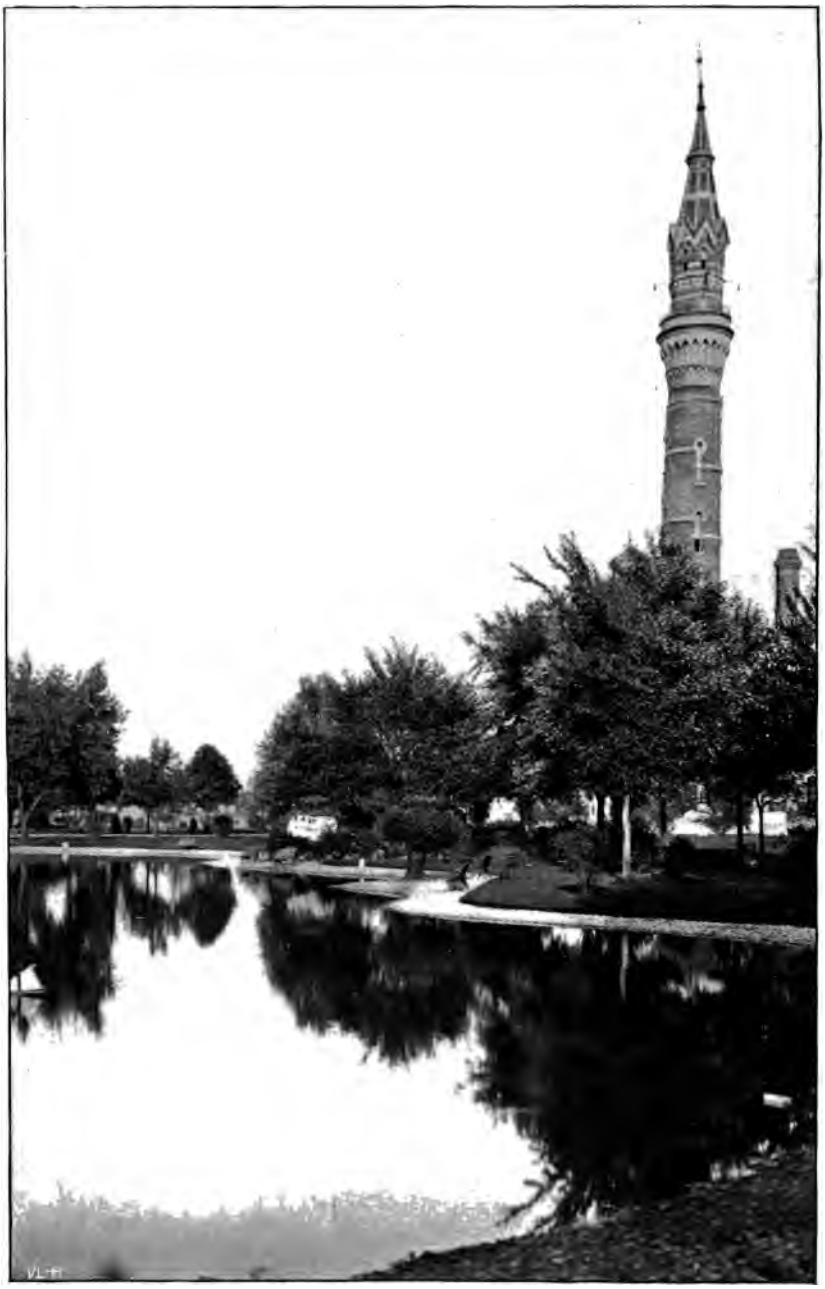
MEMORANDUM REPORT.

One thousand two hundred feet 42 inch pipe laid in Congress, Brooklyn and River streets to June 30th, 1904.

Cost—Labor, teaming, lumber, coal, packing, lead, brick sand, cement, $20,498.95.

Respectfully submitted,

JOHN DELANY,
Superintendent of Construction.



VIEW IN WATER WORKS PARK.

SUPPLEMENT.

BOARD OF MANAGEMENT OF DETROIT WATER WORKS.

Board of Trustees appointed by Common Council, February 24th, 1852; organized March 1st, 1852.

Shubael Conant, Chairman. Edmund A. Brush.
Henry Ledyard. Wm. R. Noyes.
Jas. A. Van Dyke.

1853.

On the 16th of May, 1853, the Board of Water Commissioners of the City of Detroit was organized under an act previously approved by the Common Council and passed by the Legislature, February 14th, 1853. The term of service was determined by lot, as follows:

Jas. A. Van Dyke,	for 3 years.
Edmund A. Brush,	for 4 years.
Henry Ledyard,	for 5 years.
Shubael Conant,	for 6 years.
Wm. R. Noyes,	for 7 years.

Shubael Conant was elected President, who, finding the duties too arduous, resigned July 30th, and Edmund A. Brush was elected.

1854.

Edmund A. Brush, President. Jas. A. Van Dyke.
Shubael Conant. Wm. R. Noyes.
Henry Ledyard.

1855.

Edmund A. Brush, President.
Henry Ledyard.
Shubael Conant.
William R. Noyes.
James A. Van Dyke, died May 8th.
A. D. Fraser, appointed to fill vacancy.

1856.

Edmund A. Brush, President.
Shubael Conant.
Wm. R. Noyes.
Alexander D. Fraser, re-appointed May 1st, for 5 years.
Henry Ledyard.

1857.

Edmund A. Brush, President, re-appointed May 1st, for 5 years.
Henry Ledyard.
Alexander D. Fraser.
William R. Noyes.
Shubael Conant.

1858.

Edmund A. Brush, President.
Shubael Conant.
Alexander D. Fraser.
Henry Ledyard, re-appointed May 1st, for 5 years.
Wm. R. Noyes.

1859.

Edmund A. Brush, President.
Alexander D. Fraser.
Wm. R. Noyes.
Shubael Conant, term expired May 1st, and
Julius D. Morton, appointed for 5 years.
Henry Ledyard, vacated by moval from city, and
John V. Ruehle, appointed May 1st to fill vacancy.

1860.

Edmund A. Brush, President.
Alexander D. Fraser.
Julius D. Morton.
William R. Noyes, re-appointed May 1st, for 5 years.
John V. Ruehle.

1861.

Edmund A. Brush, President.

Alexander D. Fraser, re-appointed May 1st for 5 years.

Jno. V. Ruehle, resigned Sept. 16th, and

Chauncey Hurlbut appointed to fill vacancy.

1862.

Edmund A. Brush, President, re-appointed May 1st, for 5 years.

Wm. R. Noyes.

Julius D. Morton.

Chauncey Hurlbut.

Alexander D. Frazer.

1863.

Edmund A. Brush, President.

Alexander D. Frazer.

Wm. R. Noyes.

Julius D. Morton.

Chauncey Hurlbut, term expired May 1st, and

Stanley G. Wight, appointed for 5 years.

1864.

Edmund A. Brush, President.

Alexander D. Frazer.

Wm. R. Noyes.

Julius D. Morton, term expired May 1st.

Stanley G. Wight.

1865.

Edmund A. Brush, President.

Wm. R. Noyes, resigned Jan. 10, and Jacob S. Farrand appointed to fill vacancy, Term expired May 1st. Re-appointed for 5 years.

Alexander D. Frazer.

Stanley G. Wight.

Julius D. Morton, re-appointed for 5 years from May 1st, 1864. Died Feb. 1865, and

Jno. Owen appointed to fill vacancy.

1866.

Edmund A. Brush, President.

Alexander D. Fraser, re-appointed May 1, for 5 years.

Stanley G. Wight.

Jacob S. Farrand.

Jno. Owen.

1867.

Edmund A. Brush, President, re-appointed May 1, for 5 years.
Alexander D. Fraser.
Jacob S. Farrand.
Jno. Owen.
Stanley G. Wight.

1868.

*Edmund A. Brush, President.
Stanley G. Wight, term expired May 1, and
Chauncey Hurlbut appointed for 5 years.
Jacob S. Farrand.
John Owen.
Caleb Van Husan.

*Edmund A. Brush resigned January 28, and Caleb Van Husan appointed to fill vacancy, and Alexander D. Fraser elected President.

1869.

Alexander D. Fraser, President.
John Owen, re-appointed May 1, for 5 years.
Jacob S. Farrand.
Caleb Van Husan.
Chauncey Hurlbut.

1870.

Alex. D. Fraser, President.
Jacob S. Farrand, re-appointed May 1, for 5 years.
Jno. Owen.
Caleb Van Husan.
Chauncey Hurlbut.

1871.

*Alex. D. Fraser, President.
Jacob S. Farrand.
Caleb Van Husan.
Chauncey Hurlbut.
John Owen.

*Term expired May 1, and Samuel F. Hodge appointed for 5 years. Jacob S. Farrand elected President.

1872.

Jacob S. Farrand, President.
Jno. Owen.
*Caleb Van Husan.
Samuel F. Hodge.
Chauncey Hurlbut.

*Term expired May 1st, and Elija Smith appointed for 5 years.

1873.

*Chauncey Hurlbut, President. Jacob S. Farrand.
Jno. Owen. Samuel F. Hodge.
Elija Smith.

*Term expired and re-appointed. Elected President, May, 1872.

1874.

Chauncey Hurlbut, President. Jacob S. Farrand.
*Jno. Owen. Samuel F. Hodge.
Elija Smith.

*Term expired and re-appointed.

1875.

Chauncey Hurlbut, President. *Jacob S. Farrand.
Jno. Owen. Samuel F. Hodge.
Elija Smith.

*Term expired and re-appointed.

1876.

Chauncey Hurlbut, President. Jacob S. Farrand.
Jno. Owen. *Samuel F. Hodge.
Elija Smith.

*Term expired and re-appointed.

1877.

Chauncey Hurlbut, President. Jacob S. Farrand.
Jno. Owen. Samuel F. Hodge.
*Michael Martz.

*Elija Smith's term expired and Michael Martz appointed to fill vacancy.

1878.

*Chauncey Hurlbut, President. Jacob S. Farrand.
Jno. Owen. Samuel F. Hodge.
Michael Martz.

*Term expired and re-appointed.

1879.

Chauncey Hurlbut, President. Jacob S. Farrand.
Michael Martz. *Jas. Beatty.
*Jno. Pridgeon.

*Jno. Owen's term expired and John Pridgeon appointed to fill vacancy. Samuel F. Hodge resigned and Jas. Beatty appointed to fill vacancy.

1880.

Chauncey Hurlbut, President. *Jacob S. Farrand.
Michael Martz. Jas. Beatty.
Jno. Pridgeon.

*Term expired and re-appointed.

1881.

Chauncey Hurlbut, President. Jacob S. Farrand.
Michael Martz. *Jas. Beatty.
Jno. Pridgeon.

*Term expired and re-appointed.

1882.

Chauncey Hurlbut, President. Jacob S. Farrand.
*Michael Martz.' Jas. Beatty.
Jno. Pridgeon.

*Term expired and re-appointed.

1883.

*Chauncey Hurlbut, President. Jacob S. Farrand.
Michael Martz. Jas. Beatty.
Jno. Pridgeon.

*Term expired and re-appointed.

1884.

Chauncey Hurlbut, President. Jacob S. Farrand.
Michael Martz. Jas. Beatty.
*Jno. Pridgeon.

*Term expired, and Marshall H. Godfrey appointed

1885.

*Jacob S. Farrand, President. Michael Martz.
Marshall H. Godfrey. *Edwin F. Conely.
*Samuel G. Caskey.

*Jas. Beatty died and Edwin F. Conely appointed to fill vacancy.
*Chauncey Hurlbut died and Samuel G. Caskey appointed to fill vacancy.
*Jacob S. Farrand's term expired and re-appointed.

1886.

Jacob S. Farrand, President. Michael Martz.
Marshall H. Godfrey. *Jno. Pridgeon.
Samuel G. Caskey.

*Edwin F. Conely's term expired and Jno. Pridgeon appointed to fill vacancy.

1887.

Jacob S. Farrand, President. Jno. Pridgeon.
Marshall H. Godfrey. Samuel G. Caskey.
*Joseph Nagel.

*Michael Martz term expired and Joseph Nagel appointed to fill vacancy.

1888.

Jacob S. Farrand, President. Jno. Pridgeon.
Marshall H. Godfrey. *Samuel G. Caskey.
Joseph Nagel.

*Term expired and re-appointed.

1889.

Jacob S. Farrand, President. Jno. Pridgeon.
Samuel G. Caskey. Jos. Nagel.
*August Goebel.

*Marshall H. Godfrey resigned January 1, 1889. August Goebel appointed to fill vacancy. Term expired May 1st, and re-appointed.

1890.

Jno. Pridgeon, President. August Goebel.
Joseph Nagel. *Henry M. Duffield.
Samuel G. Caskey.

***Jacob S. Farrand's term expired, and Col. Duffield was appointed to fill vacancy July 9th, 1890; John Pridgeon resigned as President of the Board, on account of ill-health, and Henry M. Duffield was elected to fill vacancy.**

1891.

Henry M. Duffield, President. *Jno. Pridgeon.
August Goebel. Samuel G. Caskey.
Joseph L. Hudson.

***John Pridgeon's term expired May 1st, and Frank E. Kirby was appointed for a term of 5 years.**

1892.

Samuel G. Caskey, President. Henry M. Duffield.
August Goebel. Joseph L. Hudson.
Frank E. Kirby.

1893.

August Goebel, President. Samuel G. Caskey.
Frank E. Kirby. Henry M. Duffield.
Joseph L. Hudson.

1894.

Henry M. Duffield, President. Frank E. Kirby.
Albert L. Stephens. De Witt H. Moreland.
Edward W. Pendleton.

A. L. Stephens appointed to succeed J. L. Hudson.
D. W. H. Moreland appointed to succeed S. G. Caskey.
Clarence A. Black appointed to succeed August Goebel.
C. A. Black resigned and E. W. Pendleton appointed to succeed him from Dec, 1.

1895.

Frank E. Kirby, President. Albert L. Stephens.
DeWitt H. Moreland. Edward W. Pendleton.
Darius D. Thorp.

1896.

Albert L. Stephens, President.
Edward W. Pendleton.
John P. Huckestein.
Darius D. Thorp.
John W. McGrath.

D. W. H. Moreland resigned to accept Commissionership on Board of Public Works, and J. P. Huckestein was appointed to fill vacancy.

Frank E. Kirby's term expired and J. W. McGrath was appointed to succeed him

1897.

Edward W. Pendleton, President.
Darius D. Thorp.
James W. Millen.
John W. McGrath.
August Goebel.

August Goebel, appointed to succeed A. L. Stephens. Resigned January 1, 1898, and Joseph J. Noeker was appointed to fill vacancy.

John P. Huckestein resigned and James W. Millen was appointed to fill vacancy.

1898.

Edward W. Pendleton, President.
Joseph J. Noeker.
John W. McGrath.
Darius D. Thorp.
James Meathe.

1899.

Darius D. Thorp, President.
John W. McGrath.
Joseph J. Noeker.
*James Meathe.
Edward W. Pendleton.

*James Meathe died September 21st, 1899, and Benjamin Guiney was appointed to fill vacancy.

1900.

John W. McGrath, President.
Joseph J. Noeker.
*Benjamin Guiney.
Edward W. Pendleton.
Darius D. Thorp.

Benjamin Guiney resigned, and John Zynda was appointed to fill vacancy.

1901.

Joseph J. Noeker, President.
John Zynda.
Edward W. Pendleton.
Darius D. Thorp.
Joseph J. Crowley.

1902.

John Zynda, President.
Darius D. Thorp.
Edward W. Pendleton.
Joseph J. Crowley.
John Schroeder.

1903.

Edward W. Pendleton, President.
Darius D. Thorp.
Joseph J. Crowley.
John Schroeder.
John Zynda.

1904.

Darius D. Thorp, President.
Joseph J. Crowley.
John Schroeder.
John Zynda.
Edward W. Pendleton.

VIEW IN WATER WORKS PARK.

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FIFTY-THIRD
ANNUAL REPORT
OF THE
BOARD OF WATER COMMISSIONERS

WATER WORKS 1874.

TO THE

COMMON COUNCIL OF THE CITY OF DETROIT

FIFTY-THIRD ANNUAL REPORT

OF THE

BOARD OF WATER COMMISSIONERS

OF THE CITY OF DETROIT

TO THE

COMMON COUNCIL OF THE CITY OF DETROIT

TOGETHER WITH THE

REPORTS OF THE OFFICERS OF THE BOARD

FOR YEAR

ENDING JUNE 30TH, 1905.

DETROIT FREE PRESS PRINTING COMPANY,
1905

CONTENTS.

PAGE

Report of the Commissioners 7

Financial Report of the Secretary 11

Report of the General Manager 29

Report of the Civil Engineer 36

Report of Superintendent of Meters and Inspection 48

Report of the Chief Engineer at Pumping Works 55

Report of the Superintendent of Construction 60

Supplement 73

7-32

BOARD OF WATER COMMISSIONERS

OF THE

CITY OF DETROIT.

MEMBERS:

JOSEPH J. CROWLEY, 1906. JOHN ZYNDA, 1908.
JOHN SCHROEDER, 1907. EDWARD W. PENDLETON, 1909.
JOHN F. DODGE, 1910

COMMITTEES:

Ways and Means	Commissioners PENDLETON, SCHROEDER.
Extension and Construction,	Commissioners DODGE, ZYNDA.
Pumping Works	Commissioners SCHROEDER, PENDLETON.
Supplies	Commissioners ZYNDA, DODGE

The President is ex-officio member of each committee.

OFFICERS:

President	JOSEPH J. CROWLEY.
Vice-President	JOHN SCHROEDER.
General Manager	H. S. STARKEY.
Secretary	BENJ. F. GUINEY.
Superintendent of Construction	JOHN DELANY.
Supt. of Meters and Inspection	THOMAS R. PUTNAM.
Civil Engineer	CLARENCE W. HUBBELL.
Chief Engineer at Pumping Works	URIAH GOULD.
Bookkeeper	W. W. WILCOX.
Receiving Clerk	GEORGE E. KUNZE.
Cashiers	S. G. ROOD. CHARLES W. KEENA.
Meter Clerks	GERALD P. MONAGHAN. CHAS. F. GILMER.
Permit Clerk	WM. L. WALLACE.
Collectors	FRANK PETZ. ALBERT L. STADLER. ANTHONY VOGEL. ANTHONY J. LOOK. WM. COSGROVE. JOHN J. ROBINSON. M. A. DETTLING. THOMAS J. CLANCY. JOHN C. BECKER.

THE BOARD OF WATER COMMISSIONERS

OF THE

CITY OF DETROIT.

RATES JULY 1, 1905.

METER RATES.

Payable Quarterly.	QUARTERLY
First 30,000 gals	$1 75
All in excess of 30,000 gals	2¼ cts. per M.
Minimum Rate	1 75

ASSESSMENT RATES.

	PER ANNUM
For Family, household purposes	$2 60
Additional Families to first, in same house supplied through same faucet, each family	1 40
Green Houses.—Special rates.	
Private Stable, for each horse	1 20
Livery Stables, “ “ “	1 20
Dray and Team Horses, each	60
Cows, each	60
Stores and Offices, from	$1 00 to 12 00
Bakeries, average daily use for each barrel of flour	2 00
Groceries and Provision Stores, from	$3 00 to 50 00
Saloons, from	6 00 to 50 00
Bar, with faucet, from	8 00 to 50 00
Fish Houses, from	6 00 to 50 00
Beer Pump	2 00
Barber Shops, each chair	2 00
Slaughter Houses.—Special rates.	
Hotels and Taverns, in addition to family rate, each room	60
Boarding Schools, from	$4 00 to 50 00
Printing Offices.—Special rates.	
Butcher Stalls, each not less than	3 00
Workshops, for 10 persons or under	3 00
“ for each additional 10 persons	1 00
Boarding Houses, in addition to family rate, each boarder or roomer,	40
Estimated quantities of water each 1,000 gallons	07
Building Purposes, each 1 M brick	03
“ “ “ 100 yards plastering	05
“ “ “ perch stone	01
“ “ minimum	50

FIXTURES.

Bath Tub, for families, 1st tub	$1 00
“ “ each additional tub.	60
“ “ public, each tub	4 00
Automatic Water Closets, for family, 1st closet	1 60
“ “ “ each additional	60
“ “ “ for hotels, stores, factories, etc., for 10 persons	2 00
“ “ “ each additional person	20
Rod Water Closets, not less than	6 00
Urinals, not less than	2 00
Wash Hand Basins, for family, each	50
“ “ “ for other purposes, each person	15
Hose Bibb or Connection, premises 30 feet front or less	60
“ “ “ “ 30 feet to 60 feet	80
“ “ “ “ 60 feet to 100 feet	1 60
Special Rates for larger grounds.	
Fountains	$5 00 to 20 00
Street Sprinklers, each wagon	50 00

Where there is a waste of water an increase of rates will be made.

ANNUAL REPORT

OF THE

BOARD OF WATER COMMISSIONERS

OF THE

CITY OF DETROIT.

To the Honorable the Common Council of the City of Detroit:

An hydraulic guage is not only a convenient device for determining the amount of water in a boiler; but is also an excellent method of ascertaining the expansion of a city. According to this test, from July 1st, 1904, to July 1st, 1905, the number of inhabitants of Detroit has increased about sixteen thousand.

Notwithstanding this rapid increase in population, it has been the purpose of this Board to keep well ahead of the water demands of the city. This has been accomplished, with only occasional instances of any lack of abundant supply. During the past year there has been a healthy agitation of the subject of fire protection and this Board does not seek to evade its just share of responsibility in this matter. We are co-operating in harmony with the Fire Department in the endeavor to fully meet the demands for fire protection under the present system. It is not the province of this Board, but of the Board of Fire Commissioners, to recommend to your honorable body and to the Board of Estimates any new system for fire protection, which Greater Detroit may require.

The close of this fiscal year is an epoch in the evolution of this department, and marks the completion of consecutive work for several years, resulting in a substantial enlargement and betterment of the plant, this work consisting of the ample addition to the Pumping Station, the installation of two high-pressure engines of large capacity, the construction of a distribution main, forty-two inches in diameter, and a tunnel extending a distance of three thousand one hundred and sixty feet, running under the river at a depth of seventy feet.

The city will now have two independent and separated supply systems, as the old intake pipes will be kept in commission always ready for use as necessity or convenience may require.

The attention of your honorable body is especially called to the matter of the sewerage of the territory east of the city limits. At a joint conference of a committee of the Common Council, the Board of Health, and this Board, held at the city hall last fall, this matter was fully discussed; but proceedings were deferred pending the action of the Legislature upon the annexation of the village of Fairview. Under Article Four, Section Four, of the Constitution of Michigan, the city boundaries cannot be altered excepting at a session of the Legislature, immediately following the State or the United States census. This will defer any possibility of annexation until the session of 1911.

We, therefore, respectfully request your honorable body to take such action as you may deem best that the water supply of the City of Detroit may be permanently protected from contamination on account of sewerage.

The amount of water pumped during the year was 21,977,576,875 gallons, an average of 60,212,539 gallons per day, with a daily per capita (city) of 168 gallons. The largest amount pumped in any one day was 99,316,828 gallons.

A large manufacturer of mustard once said: "It is not what people use, but what people waste that makes my fortune." With equal truth it may be said that it is not what people use, but what people waste that greatly increases the expense of water supply. A commission especially appointed for the examination of the water supply of New York City reported that "the useless loss of water by preventable waste is, at least, one-half of the amount pumped." The necessity of placing, in Detroit, some red danger lights along this line will be appreciated, when it is remembered that the water-rate payers are burdened with the unlimited free use of water by the Detroit United Railway for sprinkling between its tracks, in addition to the requirements of furnishing water for the fire department, all municipal buildings and the public schools, and also the Park and Boulevard Commission. As the entire city is benefited, the entire property of the city, and not the water consumers only, should bear the burden of this largely increasing expense. During the past year the water used upon Belle Isle alone was 262,997,704 gallons, being more than the amount supplied to the combined villages of Delray, River Rouge, Ecorse and Highland Park.

The total receipts for the year amounted to the sum of $883,509.16, of which sum $250,000.00 was received from the re-issue of bonds, the sum of $1,254.40 from the village of Woodmere, $3,767.00 from the village of Hamtramck, $11,336.00 from the village of River Rouge, $3,538.54 from the village of Highland Park, the sum of $108.00 from the village of Ecorse, the sum of $730.00 from the village of Ste. Claire Heights, and the sum of $22,820.00 from the village of Fairview.

The amounts received from these villages were to cover the actual cost of pipe extensions.

The total expenditures for the year was the sum of $1,099,410.59. Of this amount the sum of $487,379.30 was expended for construction, $170,130.90 for operation and maintenance and $378,000.00 for redemption of bonds.

Your attention is called to the reports of the officers of the board submitted herewith, which contain full statements of the work of the various department.

We invite your careful inspection of the methods employed and the work accomplished.

All of which is respectfully submitted.

Dated, Detroit, July 1, 1905.

JOSEPH J. CROWLEY,
JOHN SCHROEDER,
JOHN ZYNDA,
EDWARD W. PENDLETON,
JOHN F. DODGE,
Commissioners.

REPORT OF THE SECRETARY.

Detroit, Mich., July 1, 1905.

To the Board of Water Commissioners of the City of Detroit:

Gentlemen—I have the honor to submit the Secretary's report for the year ending June 30th, 1905. It will show the total receipts to be $883,509.16 and total disbursements $1,009,410.56. There are items included in both these amounts which should be classed as extraordinary, namely: Receipts; bond issue, $250,000.00; village of Fairview for extension, $22,820.00; from other villages, $20,733.94; total, $293,553.94. Disbursements: Bonds redeemed, $378,000.00; tunnel and crib, $147,515.92; engines, 40,000.00; total, $565,515.92. A detailed statement of receipts and disbursements follows:

Receipts.

Water rates assessed	$292,094 69	
Water rates metered	167,919 76	$460,014 45
Shutting off and letting on		233 25
Percentage		5,707 19
Plumbers' license		426 50
Service cocks, material and labor		2,383 06
Service cocks, permits		7,772 75
City of Detroit, general tax levy		75,000 00
Real estate revenue and expense		1,580 44
Meter account		41 91
Meter repairs		72 00
Iron pipe, material and labor		28,489 25
Iron pipe, bonus		1,369 30
Pumping works		617 87
Pumping water		135 85
Repairing leaks		66 47
Engineering		3 09

Interest Account, interest on Gen. Account.		4 483 90
Interest Account, interest Sinking Fund and Bonus Sale of Bonds..................		16,833 48
Hurlburt Fund, from trustees............	4,000 00	
Hurlburt Fund, interest on daily balance..	20 21	4,020 21
Bonded indebtedness		250.000 00
Service extensions		117 14
Inspection Account		37 50
Horse and Wagon Account...............		5 00
Village of Fairview......................		22,820 00
Office Account		1.278 55
		$883.509 16

Disbursements.

OPERATION AND MAINTENANCE.

Office Account—		
General manager, secretary and clerks..	$ 25 942 22	
Watchmen and janitor.................	1,999 36	
General work and carpenter............	1,474 50	
Scrubbing	117 00	
Books, printing and stationery.........	1,350 27	
Printing annual reports................	272 79	
Telephone service	239 98	
Advertising and subscriptions...........	408 74	
Postage and stamped envelopes........	266 70	
Towel supply	78 00	
Legal services and court fees...........	255 00	
Street car tickets.......................	15 00	
Rubber stamps	9 40	
Disinfectant and cleaning material......	22 85	
Ice	58 05	
Gas	7 89	
Horse care	180 00	
Horse expense, shoeing..................	19 50	
Refund check, Hayden, Miller & Co.....	1,000 00	
Miscellaneous	178 83	
		$ 33,896 08
Service Connections and Leaks Account—		
Superintendent and labor................	$ 18,426 77	
Service cocks, sleeves and valves........	3,413 93	
Tools and repairs.......................	103 79	
Printing and stationery.................	24 00	
Car fare	218 00	
Telephone	51 00	

Oil	6 10	
Freight and express	13 85	
Inspection and paving repairs	367 79	
Rubber boots and repairs	4 44	
Lead pipe fittings	103 40	
		22,733 07
Pumping Water Account—		
Engineers and firemen	$ 36,143 59	
Coal	35,177 60	
Unloading coal	3,845 31	
Boiler and engine supplies	360 97	
Boiler and engine repairs	1,242 66	
Engine oil and grease	566 21	
Kerosene and gasoline	16 00	
Waste, packing and rags	878 85	
Boiler inspection	36 00	
Electric light fixtures and repairs	2 40	
Hose and couplings	34 69	
Tools	95 78	
Paint and glass	57 11	
Printing and stationery	14 55	
Telephone	84 00	
Ice and towel supply	88 14	
Freight and express	7 02	
Doctor's services	225 00	
Wagon repairs	5 00	
Care fare	4 00	
Horse shoeing and harness	31 35	
Feed and bedding	82 74	
Miscellaneous	158 86	
		$ 79,157 83
Repairing Leaks Account—		
Supt. clerks and watchmen	$ 3,151 00	
Inspection and pavement repairs	446 69	
Telephone	33 00	
Tools and repairs	36 04	
Car Fare	20 00	
Teaming	3 50	
Kerosene and gasoline	2 85	
Pump repairs	56 43	
Rubber boots	64 37	
Lantern globes	4 25	
Bicycle repairs	6 65	
Miscellaneous	60 10	
		$ 3,884 88

Meter Repairs and Expense Account—		
Supt. and labor	$ 1,314 50	
Fittings	706 74	
Printing	5 40	
		$ 2,026 64
Percentage Account—		
Supt. and labor	$ 7,178 33	
		$ 7,178 33
Inspection Account—		
Supt., inspection and clerks	$ 8,178 29	
Street car tickets	200 00	
Electric lamps and fixtures	45 85	
Printing	45 25	
		$ 8,469 39
Wagon and Harness Account—		
Harness and repairs	$ 291 94	
Wagon repairs	639 13	
Barn tools	36 08	
Miscellaneous	11 38	
		$ 978 53
Office Furniture and Fixture Account—		
Furniture and repairs	$ 46 08	
Electric fixtures	20 24	
Still alarm	135 00	
Linoleum, iron pipe, office	118 05	
Fittings and fixtures, iron pipe, office	78 05	
Ventilators	199 00	
		$ 596 42
Real Estate, Revenue and Expense Account—		
Coal, yard	$ 175 00	
Furnace repairs	92 70	
Insurance premium	160 98	
Lumber	95 65	
Office roof repairs	495 13	
Nails, screws and fittings	103 24	
Paint, oil and glass	46 13	
Coal, office	456 16	
Painting and fixtures, iron pipe, office	197 07	
		$ 1,822 06
Plumbers' License Account—		
Printing	$ 4 50	
		$ 4 50
Horse Expense Account, Service Connections—		
Oats, Hay, etc.	$ 572 73	
Bedding	36 31	

Shoeing	149 49	
Veterinary services and drugs	20 26	
		$ 778 79
Horse Expense Account, Repairing Leaks—		
Oats, Hay, etc	$ 565 32	
Bedding	36 31	
Shoeing	156 48	
Veterinary services and drugs	17 23	
Horse care	120 00	
		$ 895 34
Pumping Works, Grounds—		
Supt. and labor	$ 6,499 42	
Tools and fittings	229 38	
Paint, oil, etc.	45 18	
Lumber	22 99	
Sand and gravel	293 09	
Horse shoeing	24 95	
Repairs to toilet houses, library bldg. and greenhouse	381 87	
Plans improving green-house	185 46	
Miscellaneous	26 70	
		$ 7,709 04
Iron Pipe "Construction"—		
Supt. and clerks	$ 11,733 47	
Foremen	2,165 05	
Watchmen, teamsters, plumbers, bricklayers and barnmen	14,467 16	
Laborers	111,427 54	
Iron pipe	47,149 99	
Special castings	3,579 05	
Gates, valves and hydrants	10,460 38	
Pig lead	6,137 42	
Lead pipe, tin and solder	56 44	
Cement, stone, brick, sand and sewer crock	4,425 29	
Lumber	2,731 05	
Coal	366 69	
Oil and gasoline	165 68	
Tools	240 81	
Repairing tools	75 87	
Iron, nails, globes and fittings	588 22	
Channel iron and beams	252 90	
Teaming	5,216 55	
Hose and couplings	109 49	
Rope, packing and waste	97 96	

Paint, oil and glass	12 40	
Car fare	245 00	
Printing and stationery	302 59	
Wood plugs	19 47	
Telephone	177 43	
Doctor's services, ambulance and hospital	162 75	
Court fees	2 60	
Refund to village of Highland Park	926 47	
Inspection and paving repairs	2,824 00	
Switching charges and car rental	46 00	
Engine oil	8 35	
Pump repairs	64 18	
Rubber boots	65 71	
Lowering pipe at 24th and Fort and M. C. R. R. and 10th street	3,470 97	
Refund to St. Clair Heights	82 72	
Telegrams	70	
Miscellaneous	352 28	
		$230,210 63
Horse Expense Account, Iron Pipe—		
Oats, hay, etc.	$ 1,151 64	
Bedding	72 62	
Shoeing	269 49	
Veterinary services and drugs	44 87	
Horse pasture	47 50	
		$ 1,586 12
Meter—		
Supt., foremen and labor	$ 5,171 79	
Meters	5,152 65	
Meter fittings and special castings	86 10	
Lumber	154 53	
Lead, solder, etc.	14 93	
Rags and packing	4 38	
Tools and repairs	52 54	
Nails, iron and pipe	19 23	
Oil and gasoline	5 31	
Telephone	48 00	
Printing and stationery	40 20	
Bicycle reapirs	11 00	
Paint, oil and glass	58	
Horse board	180 00	
Horse shoeing	75 50	
Harness repairs	5 00	
Wagon repairs	15 00	

Flash lights	2 75	
Express and freight	1 80	
Miscellaneous	5 84	
		$ 11,047 13
Engineering Account—		
Civil engineer and assistants	$ 14,656 56	
Instruments	30 86	
Tracing cloth, paper, etc.	152 80	
Books, maps and stationery	263 41	
Street car tickets	180 00	
Stamps	10 00	
Freight and express	2 32	
Phone	74 10	
Gauges and fittings	28 09	
Lumber	6 65	
Subscriptions	5 50	
Tools	37 37	
Electric lamps, fixtures and power	19 18	
Furniture	18 30	
Miscellaneous	4 90	
		$ 15,490 04
Pumping Works Account—		
Supt., foremen and labor	$ 6,665 41	
Allis-Chalmers' engine contract	40,000 00	
Building contract and extras	1,493 64	
Spier & Rohns, Architects	598 42	
Thimbles and gates	4,422 00	
Special castings	11 13	
Cement, sand and sewer crock	280 93	
Brick	146 59	
Lumber	131 93	
Tools	31 83	
Nails, iron, etc.	23 36	
Expert Engineer, testing engines	1,000 00	
Telephone	59 50	
Paint, oil and glass	20 17	
Repairs engineer's house, lockers, buildings, etc.	276 18	
Iron rails and beams	60 41	
Valves and fittings	71 24	
Rubber boots	20 10	
Electric Fixtures	28 60	
Packing	7 78	
Engine oil, oil and gasoline	46 85	
Hay	8 40	

Coal shed repairs	931 62	
Horse shoeing	6 00	
Bulk heads and screens	843 30	
Doctor's services	25 00	
Miscellaneous	3 00	
		$ 57,213 39
Ecorse Village—		
Pay rolls	$ 1,057 51	
Teaming	79 30	
Brick, sand and stone	87 91	
Freight charges	25 10	
Gate and valves	127 40	
Iron beams	28 83	
Coal	17 50	
Fittings	2 03	
Refund	9,116 78	
Rent	20 00	
		$ 10,562 36
Fairview Village—		
Pay rolls	$ 6,431 26	
Iron pipe	6,204 56	
Hydrants	715 00	
Lumber	13 30	
Meter	356 25	
Beams	17 74	
Meter frames and fittings	15 60	
		$ 13,753 71
Tunnel and Crib—		
Pay roll inspectors	$ 2,209 42	
C. H. Fath & Son, contract	93,063 94	
W. J. Gawne & Co., crib contract	44,648 12	
Doctor's services	383 00	
Work on shaft, Fath & Son	23 25	
Testing machine	264 47	
Lumber	95 63	
Material fitting up office	36 67	
Miners' lamps	5 35	
Sluice gates	6,144 00	
Tools	42 25	
Gates for crib	590 00	
Rubber boots	5 32	
Miscellaneous	4 50	
		$147,515 92

INDEPENDENT.

Hurlbut Fund—		
Library, pay rolls	$ 1,045 00	
Labor, pay rolls	2,703 40	
Subscriptions	31 70	
Stationery and supplies	2 90	
Express charges	3 00	
Lumber	13 75	
Cement and sand	12 56	
Car tickets	5 00	
Plants, seed, etc.	47 22	
Paint, oil and glass	21 00	
Tools and fittings	69 86	
Towel supply	4 50	
Miscellaneous	50	
		$ 3,960 39
Interest—		
Coupons	$ 59 940 00	
		$ 59,940 00
Bonded Indebtedness—		
Bonds Redeemed	$378,000 00	
		$378,000 00

RECAPITULATION OF EXPENDITURES FOR OPERATION, MAINTENANCE AND CONSTRUCTION.

For Operation and Maintenance—		
Office	$ 33,896 08	
Service connections	22,733 07	
Pumping water	79,157 83	
Repairing leaks	3,884 88	
Meter repairs and expense	2,026 64	
Percentage	7,178 33	
Inspection	8,469 39	
Wagon and Harness	978 53	
Office furniture and fixtures	596 42	
Real estate revenue and expense	1,822 06	
Plumbers' license	4 50	
Horse expense (service connections)	778 79	
Horse expense (repairing leaks)	895 34	
Pumping works, grounds only	7,709 04	
		$ 170,130 90
For Construction—		
Iron pipe	$230,210 63	
Iron pipe, horse expense	1,586 12	
Meter	11,047 13	
Engineering	15,490 04	
Pumping Works	57,213 39	

Village of Ecorse	10,562 36	
Village of Fairview	13,753 71	
Tunnel and crib	147,515 92	
		$487,379 30
Hurlburt fund	$ 3,960 39	
Interest	59.940 00	
Bonded indebtedness	378,000 00	
		$441,900 39

GENERAL RECAPITULATION OF EXPENDITURES.

Total operation and maintenance	$ 170,130 90
Total construction	487,379 30
Interest paid from sinking fund	59,940 00
Bonds paid from sinking fund	378,000 00
H. F. paid from Hurlburt fund	3,960 39
Total expenditures	$1,099,410 59
Total operation	$ 170,130 90
Total construction	487 379 30
Total independent	441,900 39
Total expenditures	$1,099,410 59

The total receipts of the Receiving Clerk from July 1st, 1904, to July 1st, 1905, were as follows:

1904.		
July	$122,751 99	
August	189,879 90	
September	22.206 67	
October	91.414 72	
November	26.486 15	
December	16.432 97	
1905.		
January	96,536 51	
February	171,146 60	
March	16.393 25	
April	95,291 97	
May	15.192 90	
June	19,775 53	
Total receipts	$883,509 16	
Cash on hand June 30, 1904	2,667 80	
		$886,176 96

With bank deposits as follows:

1904.		
July	$119,066 26	
August	194,383 96	
September	20,751 19	
October	87,239 94	
November	29,781 72	
December	18,352 89	
1905.		
January	91,796 81	
February	176,737 46	
March	14,976 46	
April	90,985 38	
May	20,550 47	
June	18,594 37	
	$883,216 91	
Cash on hand June 30, 1905	2,960 05	
		$886,176 96

Cash Statement for Year Ending June 30, 1905.

		Dr.	
Cash on hand June 30, 1904		$ 2,667 80	
Cash in Bank—			
General Fund	$215,054 99		
Sinking Fund	74,415 24		
Hurlburt Fund	762 23		
Secretary Fund	1,000 00		
		$291,232 46	
Total receipts		883,509 16	
			$1,177,409 42
		Cr.	
Cash on hand June 30, 1905		$ 2,960 05	
Cash in Bank—			
General Fund	$ 46,908 01		
Sinking Fund	26,308 72		
Hurlburt Fund	822 05		
Secretary Fund	1,000 00		
		$ 75,038 78	
Total Disbursements		$1,099,410 59	
			$1,177,409 42

THE AMERICAN EXCHANGE NATIONAL BANK.

Detroit, Mich., July 1, 1905.

Benj. F. Guiney, Secretary of the Board of Water Commissioners of the City of Detroit, Mich.:

DEAR SIR—This to certify that the amounts of balances in this bank to the credit of the Board of Water Commissioners of the City of Detroit, at the close of business June 30, 1905, were as follows: General Fund, $46,908.01; Sinking Fund, $26,308.72; Hurlbut Fund, $822.05; Secretary Fund, $1,000.00.

Yours truly,
W. WILLIAMS,
Auditor.

Assessments, 1905-1906.

Dist.	WARDS.	FAMILIES.				Increase.	Vacant Tenements.	ASSESSMENTS.		
		Supplied by Meter.	Assesed.	Not Supplied.	Whole Number.			1905–1906.	Increase.	Transf'rd to Meter Rolls.
1	Ninth..	430	6010	3	6,443	156	15	$20,078 80	$573 50	$278 10
	Fifteenth....	205	2494	1	2,700	199	11	12,401 30	1,092 05	97 70
	Seventeenth.	158	3452	12	3,622	259	19	17,708 10	1,880 80	123 70
	Total	793	11956	16	12,765	614	45	50,188 20	3,554 35	499 50
2	Eleventh....	229	4333	2	4,564	162	13	16,438 00	1,017 50	148 70
	Thirteenth.	284	3893	1	4,178	220	41	16,372 30	1,251 30	148 80
	Total	513	8226	3	8,742	382	54	32,810 30	2,268 80	297 50
3	First..	1,070	3072	....	4,142	519	72	21,040 40	936 40	159 10
	Seven'h	416	3421	2	3,839	68	26	12,371 30	249 80	133 40
	Total	1,486	6493	2	7,981	587	98	33,411 70	1,186 20	292 50
4	Third..	785	3538	4	4,327	178	34	16,335 90	910 50	112 00
	Fifth..	541	4304	2	4,847	179	42	16,979 70	949 30	275 50
	Total	1,326	7842	6	9,174	357	76	33,315 60	1,859 80	387 50
5	Second	953	1886	1	2,840	64	60	17,169 90	31 10	221 82
	Sixth..	782	3837	1	4,620	209	25	18,384 30	921 30	38 89
	Total	1,735	5723	2	7,460	273	85	35,554 20	952 40	260 71
6	Tenth.	438	4997	4	5,439	288	135	21,598 30	1,024 40	161 80
	Fourteenth.	169	3370	11	3,550	103	48	14,877 50	1,038 80	172 50
	Total	607	8367	15	8,989	391	183	36,475 80	2,063 20	334 30
7	Fourth.	816	3074	6	3,896	57	65	18,689 50	634 60	246 80
	Twel'th	226	4068	6	4,300	151	49	16,852 10	787 60	239 40
	Total	1,012	7142	12	8,196	208	114	35,541 60	1,422 20	486 20
8	Eighth.	462	4002	2	4,466	135	27	18,963 10	650 00	125 00
	Sixteenth.	296	5282	23	5,601	340	33	21,509 90	1,938 80	252 90
	Total	758	9284	25	10,067	475	60	40,473 00	2,588 80	377 90
	Grand Total	8,260	65038	81	73,374	3,287	715	$297,770 40	$15,985 75	$2,936 11

As shown in this table, July 1, 1905, there were 73,374 families supplied with water. Using the average per family obtained as in previous years, 5.04, the population of the city at that time was 369,805, an increase over July 1, 1904, of 16,567.

The average used was obtained by taking the population as shown by the United States Census of 1860-70-80-90, and 1900, and dividing by the number of families on Assessors' books for those years, as follows:

Years.	Population per census.	No. of families assessed.	Average.
1860	45,619	8,973	5.08
1870	79,757	14,717	5.42
1880	116,340	22,423	5.18
1890	205,876	42,059	4.80
1900	285,704	60,524	4.72

Making the general average 5.04.

The Civil Engineer of the Board in his report estimates the population to be 341,931.

The following table shows the receipts for water rates during the year, arranged by districts, and giving the amount collected upon each annual assessment:

RECEIPTS OF WATER RATES BY DISTRICTS,

From July 1st, 1904, to July 1st, 1905.

YEARS.	1st District Wards 9, 15 and 17.	2d District, Wards 11 and 13.	3d District, Wards 1 and 7.	4th District, Wards 3 and 5.	5th District, Wards 2 and 6.	6th District, Wards 10 and 14.	7th District, Wards 4 and 12.	8th District, Wards 8 and 16.	Meters.	Total.
1895-96							3 00			$3 00
1897-98				75			75			1 50
1898-99			1 00							1 00
1899-00			2 00		3 25					5 25
1900-01		14 40	2 00							16 40
1901-02		14 40			6 02					20 42
1902-03	6 10	14 40	1 30		3 12		1 85			26 77
1903-04	1,374 69	493 92	879 28	886 10	1,040 44	843 78	921 41	$832 19		7,271 81
1904-05	48,212 55	31,123 81	32,374 33	31,260 80	34,271 92	35,162 76	34,144 85	38,197 52	$167,919 76	452,668 30
Total..	$49,593 34	$31,660 93	$33,259 91	$32,147 65	$35,324 75	$36,006 54	$35,071 86	$39,029 71	$167,919 76	$460,014 45

Estimated Valuation of Works.

Real estate	$ 441,671	75
Building docks, basins, conduits, tunnel and crib engines, etc., at pump works	2,461,789	51
Water pipe in use	4,687,564	43
Meters in use	106,467	67
Office furniture and fixtures	9,151	88
Tools and material on hand:		
In office of civil engineer	24,469	25
In office of supt. of construction	454	00
In inspection department	142	75
In meter department	2,861	84
In pumping works department	15,884	47
In Hurlburt fund department	2,444	32
At storage yards	80.860	19
In service connections department	2.839	03
	$7,836,601	09

The amount expended for the Pumping Works to July 1st, 1905.

	Previously Expended.	July, 1905.	Total.
Land	$38,331 44	....	$38,331 44
Force Mains	624,058 03	....	624,058 03
Inlet Pipe	104,257 36	....	104,257 36
Docks, Basins and Canal	152,923 86	....	152,923 86
Conduits and Wells	288,540 81	11,913 17	300,453 98
Engine, Boiler and Coal Houses	328,537 82	3,272 21	331,810 03
Stand Pipe and Tower	31,674 25	....	31,674 25
Pump Wells	54,221 56	....	54,221 56
Engines	525,728 87	40,000 00	565,728 87
Boilers	96,551 27	400 00	96,951 27
Engineer's House	8,139 75	276 18	8,415 93
Sewers	6,666 25	....	6,666 25
Electric Light Plant	3,108 80	28 60	3,137 40
Inspection	5,422 54	1,000 00	6,422 54
New Gallery	8,249 10	....	8,249 10
Traveling Crane	2,390 00	....	2,390 00
Grounds, Fences and Gateway	177,009 14	6,941 71	183,950 85
Library, Greenhouse and Belvedere	35,247 48	767 33	36,014 81
Tunnel and Crib	1,716 81	147,515 92	149,232 73
Miscellaneous	22,338 77	323 23	22,662 00
Totals	$2,515,113 91	$212,438 35	$2,727,552 26

Water Works Bonds.

The following table shows the whole history of the bonded indebtedness of the Board, in which it will be seen that the total amount of bonds issued is $2,800,000, of which $1,645,000 have been redeemed or refunded, leaving outstanding $1,155,000.

The $100,000.00 seven per cent. bonds which matured September, 1899, and $100,000.00 seven per cent. bonds which matured February 1st, 1900, were on the latter date refunded at three and one-half per cent. $100,000.00 of the $250,000.00 seven per cent bonds which matured August 1st, 1904, were refunded at 4 per cent.

No. of Issue.	Act of	Issued.	Payable.	Amount.	Rate of Interest.	Redeemed or Refunded	Outstanding.
1st	1853	Aug. 1, 1853	Aug. 1, 1883	$100,000	7cts.	$100,000	....
"	"	" "	Aug. 1, 1878	100,000	7 "	100,000	....
"	"	" "	Aug. 1, 1873	50,000	7 "	50,000	....
2nd	1855	Aug. 1, 1855	Aug. 1, 1890	100,000	7 "	100,000	....
"	"	June 12, 1855	Aug. 1, 1885	100,000	7 "	100,000	....
"	"	" "	Aug. 1, 1880	50,000	7 "	50,000	....
3rd	1857	Aug. 1, 1858	Aug. 1, 1893	150,000	7 "	150,000	....
"	"	Aug. 1, 1867	Aug. 1, 1887	100,000	7 "	100,000	....
* 4th	1869	Feb. 1, 1870	Feb. 1, 1900	100,000	7 "	100,000	....
5th	"	Aug. 1, 1872	Aug. 1, 1902	50,000	7 "	50,000	....
6th	"	Aug. 1, 1873	Aug. 1, 1903	50,000	7 "	50,000	....
"	1873	Feb. 1, 1874	Feb. 1, 1904	50,000	7 "	50,000	....
7th	1869	Aug. 1, 1874	Aug. 1, 1904	50,000	7 "	50,000	....
"	1873	" "	" "	200,000	7 "	200,000	....
"	"	June 1, 1875	June 1, 1905	150,000	7 "	137,000	13,000
"	"	June 1, 1876	June 1, 1906	200,000	6 "	8,000	192,000
* "	"	Sept. 1, 1880	Sept. 1, 1899	100,000	4 "	100,000	....
"	"	April 1, 1881	April 1, 1897	100,000	4 "	100,000	....
"	"	Dec. 1, 1881	Dec. 1, 1896	50,000	4 "	50,000	....
"	"	Jan. 10, 1895	Jan. 10, 1925	100,000	4 "	....	100,000
*Refund	1869 1873	Feb. 1, 1900	Feb. 1, 1930	200,000	3½"	....	200,000
	1873	Jan. 1, 1903	Jan. 1, 1933	50,000	3½"	....	50,000
	1901	Sept. 1, 1903	Sept. 1, 1933	150,000	3½"	....	150,000
	"	June 1, 1904	June 1, 1934	200,000	3½"	....	200,000
Refund	1873 1901	Aug. 1, 1904	Aug. 1, 1919	100,000	4 "	....	100,000
	1901	Feb 1, 1905	Feb. 1, 1935	150,000	3½"	....	150,000
				$2,800,000		$1,645,000	$1,155,000

Respectfully submitted,
BENJ. F. GUINEY,
Secretary.

REPORT OF THE GENERAL MANAGER.

Detroit, Mich., July 1, 1905.

To the Board of Water Commissioners of the City of Detroit:

GENTLEMEN—I respectfully submit a report of the general operations of the works for the year ending June 30, 1905.

The assessment rolls of water rates show a gain over the previous year of $15,985.75. During the year places on the assessment rolls, with a total assessment of $2,936.11, were transferred to the meter rolls.

The increase of families on assessment rolls for the same period was 3,287, an increase over the previous year of 579. The details of the number of families assessed in each ward and district, vacant tenements, number of families not supplied, and increase of assessments by wards, will be found by reference to the table of assessments in the report of the Secretary.

The total number of gallons of water pumped during the year was 21,977,576,875, of which 185,230,980 gallons were supplied to the village of Delray; 100,086,888 gallons to the village of Woodmere; 58,489,112 gallons to the village of Hamtramck; 40,590,968 gallons to the village of River Rouge; 22,272,448 gallons to the village of Highland Park, and 4,444,616 gallons to the village of Ecorse.

The pumpage for the year was the largest in the history of the works, exceeding the previous year by 242,622,641 gallons.

The average daily consumption (including villages) was 60,212,539 gallons, an average daily increase over the previous year of 827,418 gallons.

The highest day's pumpage was 99,316,828 gallons on February 14, 1905, and the lowest was 43,126,680 gallons on November 24, 1904.

The amount received for metered water was the sum of $167,919.76, of which amount the village of Delray paid $8,343.98; the village of Woodmere, $4,512.50; the village of Hamtramck, $2,640.64; the village of River Rouge, $1,835.08; the village of Highland Park, $1,044.40, and the village of Ecorse, $208.60.

Storage Grounds.

The interiors of the houses located at the grounds have been papered and painted and are in good condition. The fences have been repainted. The condition of Orleans street, which divides the grounds, is very bad during the spring and fall, and should be paved. The cement shed is not properly located, and is in need of extensive repairs. A new one is necessary, and should be built of brick.

I beg to call the attention of the Board to the necessity of a supply yard in the western part of the city. The unprecedented development of the outskirts of the city has made the matter of transportation a very serious question, and with the addition to the city next April of the villages of Delray, Woodmere and Springwells it will become more so.

Pumping Works.

The grounds at the pumping station have received the usual care. The work of protecting the intakes in the settling basin by concrete piers has been completed. The east and south banks of the basin have been graded and seeded. The ten-foot tunnel, the shore and river shafts have been completed, and work on the crib house is progressing favorably, and it will probably be ready for use by the middle of October. The two new Allis-Chalmers engines will be ready for commission about the middle of September. Ventilators have been built in the roof of the coal sheds, and the sheds are now lighted by electricity. The dock along the south end of the canal is in a very bad condition and will have to be rebuilt in the near future. The fence along the east side of the grounds requires considerable repairs, a large portion having been removed during the construction of engines and tunnel for convenience in hauling materials. About three and one-fifth acres have been added to the river front of the grounds, made from the tunnel excavations.

The following table shows the amount of water pumped each year from 1852 to 1905:

YEARS.	FAMILIES SUPPLIED.	WATER PUMPED.	
		Total Quantity.	Per Family.
1852	......	235,840,275	......
1853	4,283	308,531,743	70,868
1854	4,619	376,265,126	81,460
1855	5,282	542,807,364	102,765
1856	5,706	692,124,305	121,297
1857	6,189	697,190,528	112,650
1858	6,474	718,091,207	110,919
1859	6,794	782,112,587	115,118
1860	6,750	870,036,451	125,185
1861	7,128	895,129,423	125,579
1862	7,275	994,945,329	136,762
1863	7,699	1,035,798,043	134,534
1864	7,993	1,019,390,256	127,410
1865	8,351	1,040 514,887	125,675
1866	9,089	1,196,317,922	131,622
1867	10,242	1,425,535,230	139,186
1868	11,544	1,666,545,125	144,364
1869	12,774	1,946,810.325	152,400
1870	13,722	1,866,060.068	136,000
1871	14,896	2,300,150,605	154,414
1872	16,035	2,782,292,578	173,513
1873	17,019	3,198,393,948	187,930
1874	18,853	3,289,872,635	174,511
1875	19,606	4.207,454,260	214.600
1876	20,102	4,065,134,470	200.225
1877	20,345	4,213,239.790	207,090
1878	20,603	4,345,743 330	210,927
1879	21,341	5.129,599,110	240.348
1880	22,465	5,552.965,310	247,183
1881	23,749	6,543,127,968	279.722
1882	25,442	6,284,000,742	243.062
1883	27,415	7.379,327,788	269,170
1884	29,424	8,510,614,140	289.260
1885	30,533	9,970,829.580	326,886
1886	31,946	10,576,571.254	331,070
1887	34,486	13,168,859,808	381,860
1888	36,863	14,380,166,670	390,098
1889	39,158	12,875,334,453	328,880
1890	41,467	12,120.944,532	292,300
1891	43,933	12,057,261,236	274,470
1892	46,400	12,276,612,482	264,582
1893	49.817	13.877.977,208	278,579
1894	49,912	13,649,779,605	273,476
1895	51,426	14,698,451,954	285,818
1896	53,941	13,254,369 371	245,719
1897	54,945	12,928,821,326	235.305
1898	56,341	14,278,682,058	253,433
1899	58,931	16,348,062,701	277,410
1900	60,524	17,077,100,477	282,154
July, 1901 to July, 1902	64,718	18,333,104,706	283,320
July, 1902 to July, 1903	67,280	18,757,682.360	275,440
July, 1903 to July, 1904	70,087	21,734,954,234	* 305,181
July, 1904 to July, 1905	73.293	21.977,576,875	* 294,247

*411,115,012 gallons delivered outside Detroit: deducted from total pumped.

Pipeage System.

You are respectfully referred to the report of the Superintendent of Construction for details of the work in this department during the year.

Dead ends have been regularly blown off, gates systematically examined, and the system flushed in such districts as was necessary.

By a special act of the Legislature the Board was empowered to lay an eight-inch line from north of Highland Park village to the State Fair grounds on Woodward avenue. The 42-inch line, in River street from Sixth to Stanton, thence to Fort to Vinewood, was completed in the fall, resulting in a large increase of pressure for the down river district.

A large amount of pipe for increased fire protection was ordered laid during the year, part of which has been completed, and work is progressing rapidly on the remainder. Among the most important lines ordered are the following: 8-inch line on Torrey from Lovett to Scotten; 10-inch line on Hubbard from Myrtle to Michigan; 10-inch on Myrtle from Vinewood to Bay City R. R.; 12-inch on Hastings from Boulevard to Trombley; 8-inch on Cass from Boulevard to Milwaukee; 10-inch on Amsterdam from Third to Second; 10-inch on Isabella south of Michigan; 8-inch on Vienna from Woodward to Cass; 10-inch on Hancock from Woodward to Second; 10-inch on Clay from St. Aubin to Lossing; 10-inch on Milwaukee from Hastings to St. Aubin; 8-inch on Orleans from Milwaukee to Trombley; 10-inch on Beecher from Hyacinth to Standish; 10-inch on Standish from Beecher to Twentieth; 10-inch on Twentieth from Standish to Rose; 10-inch on Rose from Eighteenth to Twentieth; 8-inch on Toledo from Twenty-fourth to Twenty-fifth; 10-inch on Amsterdam from Second to Woodward; 8-inch on Cass north of Amsterdam; 10-inch on St. Aubin from Larned to Jefferson, and on Jefferson from St.

Aubin to Dubois; 10-inch on Beaubien from Boulevard to Piquette; 8-inch on Piquette from Beaubien to Brush.

The total mileage of the distribution system July 1, 1905, was 662 miles and 5,021 feet, of which 568 miles are within the city and 94 miles and 3,255 feet in the adjoining villages. Eighteen miles and 3,458 feet were laid during the year, of which 1,379 feet were laid in the village of Delray; 11,782 feet in village of River Rouge; 1,473 feet in village of Woodmere; 3,742 feet in village of Highland Park; 4,610 feet in village of Hamtramck; 16,116 feet in village of Fairview; said villages paying the entire cost thereof.

Data Detroit Water Works, July 1, 1904, to July 1, 1905

System of water works: Direct pressure. No reservoir.

Source of supply: Detroit River.

Number of pumping stations: One.

Type of pumps: One 30,000,000 Comp. Beam; two 24,000,000 Comp. Beam; one 24,000,000 triple Allis; two 25,000,000 triple Allis-Chalmers. Total daily capacity, 152,000,000.

Area of city: 29 square miles.

Pumpage: 21,977,576,875 gallons.

Consumption, gallons, unmetered: 15,994,477,467.

Consumption, gallons, metered: 5,983,099,408.

Average daily consumption: 60,212,539.

Consumption, per capita: 168 gallons.

Revenue, unmetered water: $292,094.69.

Revenue, metered water: $167,919.76.

Revenue, per 1,000 gallons metered water: .0268.

Revenue, per 1,000 gallons unmetered water: .017.

Number of meters: 6,076.

Kind of coal used: Bituminous, run of mine.

Price, per ton: $2.24 in sheds.

Average head against pumps in feet: 120.

Number of miles mains: 663.

Number of fire hydrants: 4,100.

Fire cisterns: 558. Capacity, 4,830,000 gallons.

Service taps: 69,552.

Gates: 7,799

The following is the report of the Board of Health of examination of the water supply for the month of June, 1905:

Appearance—Clear	Parts Per Million.
Total solids	124.0
Volatile matter	60.0
Non volatile matter	64.0
Free ammonia	.024
Albuminoid ammonia	.074
Nitrogen as nitrates	.296
Nitrogen as nitrites	.00
Chlorine	4.1
Oxygen absorbed in 15 minutes	0.26
Oxygen absorbed in 4 hours	0.62
Bacteria per cubic centimeter	193
Bacteria per cubic centimeter	442
Bacteria per cubic centimeter	148
Bacteria per cubic centimeter	135

Conclusion: The water is in good condition.

Respectfully submitted,
E. H. HAYWOOD, M. D.,
Chemist and Bacteriologist.

All of which is respectfully submitted,

H. S. STARKEY,
General Manager.

REPORT OF THE CIVIL ENGINEER.

Detroit, Mich., July 1, 1905.

To the Board of Water Commissioners of the City of Detroit:

GENTLEMEN—I respectfully submit the report of the Civil Engineer for the year ending June 30, 1905.

Ten Foot Tunnel.

A description of the River Tunnel was given in the last annual report. The work was awarded to the C. H. Fath & Son Construction Co. of Cleveland, Ohio, and the contracts were signed on April 8, 1904. Actual construction began on June 13, and the last tunnel drive was made on April 1, 1905.

The excavation was 13 ft. in diameter, and the material a tough blue clay with occasional small pockets of sand and gravel. Both the character and condition of the soil throughout the entire distance checked very accurately with the borings. The entire tunnel was driven from the shore end, and no shield was used on the work.

The air pressure required at the start was from 10 to 12 pounds. This was gradually increased as the material became softer until it reached 25 to 28 pounds at the outer end of the tunnel. At this point the water was 30 ft. deep and the roof 26 ft. thick. The highest pressure was 33 pounds, necessary on Dec. 15 on account of treacherous ground.

Sunday was usually used by the contractor for cleaning up, and repairs to the plant. During the other six days of the week work was carried on continuously 24 hours per day. Two 8 hour shifts of miners were alternated with one of masons.

Every possible precaution was taken to insure the health and safety of the men engaged on the work. Dr. Francis Duffield was appointed under the direction of the Board of Health, to examine all men working under air pressure, and to advise on sanitary questions. Special attention was given to the problem of ventilation, the purity of air in the tunnel being maintained at a higher standard than in many of the public schools in the city. The tunnel was completed without any serious accident, and without the loss of a single life.

The length of tunnel completed each month is given in the following table:

	Feet.
June 13 to July 31, 1904	200
August	297
September	354
October	408
November	403
December	333
January, 1905	454½
February	415
March	301
April (one day)	10
Total	3175½

There was some delay during the first few weeks caused by the slow delivery of brick, and also on account of the time required to install the air lock. The most rapid progress was made during the month of January, when the weather conditions were very severe, threatening on several occasions to stop the work entirely. The largest day's work occurred on Monday, January 23, when 21 feet 2 inches of tunnel was excavated and bricked up.

The river shaft and connection was completed on June 24, and the contractor is now cleaning the tunnel preparatory to the removal of his plant.

Intake Crib.

On August 2, 1904, the timber shell, completed seven courses high, was launched at the foot of Twenty-first street. The shell was then completed, the cast iron ports set, and the compartments caulked and partially filled with concrete.

On October 25, 1904, two tugs were employed, and the crib, drawing 17 feet of water, left the dock, to be towed six miles against a strong current to its permanent location, which is in the American channel of the Detroit River at a point 800 feet above the head of Belle Isle. The contractor had some difficulty in placing the crib, but on the second trial succeeded on November 8 in lowering it to an even bearing on a level clay bed in water 30 feet deep, and directly over the center line of the tunnel. The distance from the center of the shore shaft to the center of the crib is 3,149½ feet, instead of 3,160 feet, as proposed.

As rapidly as possible the water-tight compartments were pumped out one at a time, and filled with concrete up to the base of the granite face wall. The cofferdam above the permanent timber crib was then filled with broken stone and sand. Timbers were placed to protect the crib from running ice, and on December 12 work was suspended for the winter.

The crib went through the winter without damage or accident, and on March 22, 1905, the contractor for the shaft took possession of the crib, using it in sinking the shaft until June 18, when it was turned over to the crib contractor for completion.

Large Valves.

To complete the shore tunnel and connections twelve large valves were needed of the following sizes: Two 6-foot diameter, seven 7-foot diameter, one 8-foot diameter, and two 10-foot diameter. The 10-foot valves are believed to be the largest of the kind ever built. They were designed by the Engineering Department. They are of the split-wedge, double-face type, designed to hold water from either side without a bonnet. The discs are of cast steel, brass trimmed, and are hung from open cast iron frames by two bronze stems. Heavy counterbalance weights are used to make the valves operate easily.

All the valves have been delivered, and the work of setting them will be completed within a few weeks.

Pressures.

The table of pressures shows that there has been a general improvement throughout the entire city. Since July 21. 1904, the high pressure district has been regulated from Fire Engine House No. 17, at Cass and Amsterdam, where a pressure of 29 pounds is constantly maintained.

From February 7 to March 3 three small gates were opened between the two systems. This permitted about three million gallons per day to flow from the high to the low service at points where it was most needed. The gates were as follows: 4-inch by-pass at Canfield and the alley east of St. Antoine; 6-inch gate at Greenwood and Warren; 6-inch gate at Grand River and Hudson. Otherwise the list of sealed gates remained as printed in the last annual report.

Pressures in the western portion of the city are greatly increased by the Fort street 42-inch line which went into service November 25. This is best shown by the increase in pressure for the month of February, 1905, as compared with the same month in the previous year. For this purpose the following table is prepared:

DATE	Gallons per Day	Avg. Pressure at Pumps	Pres. at eng. No. 4, 18th and Howard		Pres. at eng. No. 15, Hubbard & Fort		Pres. at eng. No. 17, Junction & Rogers		Pres. at eng. No. 14, Scotten and Mich.	
			Avg.	Low	Avg.	Low	Avg.	Low	Avg.	Low
Feb. 1904	79,317,843	54.19	23.01	18	22.33	14	23.49	16	21.13	15
Feb. 1905	80,506,887	56.04	29.89	24	30.01	24	30.11	27	28.56	23
Increase	1,189,044	1.85	6.88	6	7.68	10	6.62	11	7.43	8
% "	1.5%	3.4%	29.9%	33.3%	34.4%	71.4%	28.2%	68.8%	35.2%	53.3%

	LOCATION OF GAUGES.	Elevation above City datum.	Elevat'n pounds above surface pump wells 92.00 at which engine gauges are set	AVERAGE DAILY GALLONS 59,385,121 JULY 1, 1903 TO JUNE 30, 1904				AVERAGE DAILY GALLONS 60,212,539 JULY 1, 1904 TO JUNE 30, 1905				Increase or Decrease Friction during last year		Maximum hour observed Feb. 14, 1905. 4,548,830 Gals 9 to 10 a. m. Daily Rate 109,171,920 Gals.	
				PRESSURES, POUNDS.			Fric. Loss, Lbs.	PRESSURES, POUNDS.			Fric. Loss, Lbs.	Pounds		Average Pressure Lbs.	Fric. Loss, Lbs.
		Feet.		High.	Low.	Mean. 8784 read.		High.	Low.	Mean. 5760 read		Inc.	Dec.		
Low Service	Pumping Station,	92.00	....	61	41	51.80	....	60	44	52.04	....	......	......	59.50	....
	Engine No. 26, Crane and Brinket	125.787	14.62	50	28	35.61	1.57	47	28	35.74	1.68	0.11	......	42.00	2.88
	Engine No. 7, Concord near Jefferson	124.773	14.19	40	27	35.08	2.53	42	30	35.31	2.54	0.01	......	38.00	7.31
	Truck No. 6, Elmwood and Fort.	124.495	14.07	38	25	31.53	6.20	39	28	33 31	4 66	......	1.54	35.50	9.93
	Engine No 2, Hastings near Congress	120 981	12.55	37	24	30.67	8.58	37	25	30.99	8.50	......	0.08	28.00	18.95
	Water Office, Randolph and Jefferson	125.176	14.36	36	22	28.04	9.40	33	23	28.32	9.36	......	0.04	23.50	21.64
	Truck No. 1, Wayne and Larned.	116.738	10.70	36	23	30.65	10.45	36	23	31.04	10.30	......	0.15	27.50	21.30
	Engine No. 3, Griswold and Clifford	123.059	13.44	37	25	29.74	8.62	35	23	30.00	8.60	......	0.02	27.00	19.06
	Engine No. 8, Sixth and Baker	122.144	13.05	33	20	26.88	11.87	35	21	28.44	10.55	......	1.32	23.00	23.45
	Engine No. 4, Eighteenth near Howard	116.179	10.47	33	17	26.48	14.85	35	18	30.22	11.35	......	3.50	24.00	25.03
	Truck No. 4, Twentieth near Rose	124 825	14.21	30	13	23.79	13.80	32	15	25.88	11.95	......	1.85	24.50	21.19
	Engine No. 10, Sixteenth and Bagg	125.282	14.41	33	18	25.68	11.71	34	16	27.39	10.24	......	1.47	21.00	24.09
	Engine No. 15, Hubbard near Fort	114.617	9.79	36	14	26.57	15.44	35	14	30.13	12.12	......	3.32	25.00	24.71
	Engine No. 27, Junction and Rogers	113.736	9.41	36	16	27.99	14.40	38	15	30 94	11.69	......	2.71	27.50	22.59
	Engine No. 14, Scotten near Michigan	121.369	12.71	34	15	25.90	13.19	36	17	29.02	10.31	......	2.88	26.50	20.29
	Engine No. 22, Michigan near Hammond	119.444	11.88	34	15	25.14	14.78	35	15	27.13	13.03	......	1.75	19.00	28.62
	Truck No. 10, Sheridan and Mack	140.254	20.89	39	18	28.41	2.50	40	21	27.81	3 34	0.84	......	32.50	6.11
	Engine No. 18, Mt. Elliott near Sylvester	146.233	23.48	35	15	52.21	2.76	35	19	24.69	3.87	1.11	......	27.50	8.52
	Engine No. 11, Grandy and Gratiot	143.211	22.17	29	15	23.09	6.54	30	19	24.97	4.90	1.64	......	25.50	11.83
	Engine No. 6, High near Hastings	142.631	21.92	26	15	19 75	9.65	27	15	20.46	9.66	0.01	......	19.00	18.58
	Storage Yard, Erskine near Riopelle	150.635	25.38	25	11	17.44	8.98	25	12	18.28	8.38	......	0.60	18 50	15.62
	Truck No. 5, Russell and Erskine	147.742	24.13	27	12	18.52	9.15	24	13	19.04	8.87	......	0.28	17.00	18.37
	Engine No. 5, Alexandrine near Cass	146 693	23.68	27	10	17.80	10.32	23	12	19.06	9.30	.....	1.02	15.00	20.82
	Engine No. 12, Sixteenth and Grand River.	141.546	21.45	28	11	18 44	11.91	26	10	20.03	10.56	......	1.35	16.00	22.05
	Engine No. 20, Baldwin and Gratiot	145.368	23.10	38	19	26.55	2.15	36	19	27.37	1.57	......	0.58	30.00	6.40
High Service.	Pumping Station,	92 00	.....	70	50	59.99	....	83	53	59.95	....	.. ..	......	80.00	....
	Engine No. 18, Mt. Elliott near Sylvester	146.233	23.48	41	25	34.12	2.39	49	25	34.43	2.04	......	0.35	42.00	14.52
	Engine No. 23, Moran and Boulevard	154.288	26.96	37	18	28.94	4.09	43	23	29.51	3.48	......	0.61	33.00	20 04
	*Engine No. 28, Riopelle and Milwaukee	155.556	27.52	......	.....	*........	....	34	23	27.89	4.54	......	... ..	....	*......
	Engine No. 13, Russell and Ferry	157.304	28.27	36	18	27.50	4.22	42	17	28.06	3 62	......	0.60	28.50	23.23
	Engine No. 17, Cass near Amsterdam	152.825	26.33	38	17	27.95	5.71	42	21	29 03	4.59	......	1.12	28.00	25.67
	Engine No. 21, Lincoln near Piquette	154.880	27.22	38	19	27.98	4.79	42	14	28.98	3.75	......	1.04	26.00	26.78
	Engine No. 24, Mott near John R	155.855	27.64	35	16	26.65	5.70	39	17	26 97	5.34	......	0.36	26.00	26.36

* **Engine No. 28 went into commission May 1, 1905.**

In February, 1904, the pressure at Hubbard and Fort streets was at times as low as 14 pounds, while in February, 1905, it did not go below 24 pounds. At this point the average increase is 34.4 per cent for the month given.

Population.

The report of the Secretary shows a total of 73,374 families, of which 81 are not supplied, and 293 are outside the limits but take water from city mains. In addition to this, 217 taps in the Village of Fairview were also supplied from the city mains without being metered as a village. Estimating upon the conservative basis of 4.65 persons per family, as indicated by the U. S. Census returns,* the number of persons supplied from the city mains, including Fairview, is 341,931.

The population supplied in the various villages is estimated from the number of taps at the city rate of 5.16 persons per tap.† The number of taps and the estimated number of persons supplied is as follows:

VILLAGE	No. of Taps	Population Supplied
Delray	1234	6367
River Rouge	498	2570
Ecorse	89	459
Woodmere	881	4546
Highland Park	165	851
Hamtramck	369	1904
Total	3236	16,697

Consumption.

The average use of water in the entire system was 167.9 gallons per capita daily, as compared with 178.6 for the preceding year. The details are as follows:

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*See Annual Report, 1904, Page 44.

†341,931÷66,315=5.16 persons per tap in the city.

Name of Place	U. S. Gallons Supplied July1, 1904 to June 30,1905, inc.		Estimated No. Persons Supplied	Gals. per capita daily 1904-1905	Gals. per capita daily 1903-1904
	Total	Avg. Daily			
Detroit, unmetered	15,994,477,467	43,820,486	341,931	172.8	182.8
Detroit, metered..	5,571,984,396	15,265,711			
Delray, "	185,230,980	507, 482	6,367	79.7	94.1
River Rouge "	40,590,968	111,208	2,570	43.3	44.1
Ecorse "	4,444,616	12,177	459	26.5	....
Woodmere "	100,036,888	274,211	4,546	60.3	53.3
Highland Park"	22,272,448	61,020	851	71.7	93.8
Hamtramck "	58,489,112	160,244	1,904	84.2	86.4
Total..........	21,977,576,875	60,212,539	358,628	167.9	178.6

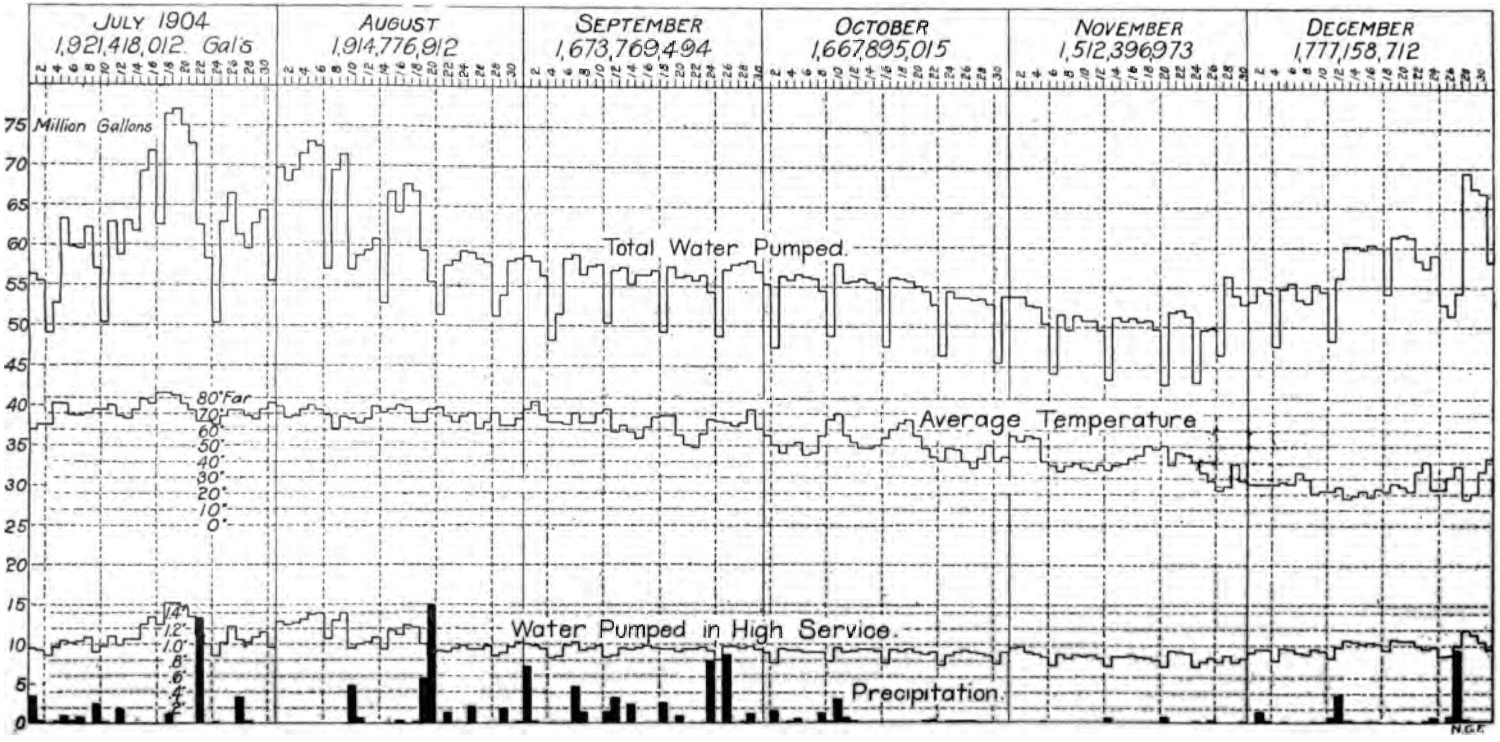
The quantity of water supplied for public uses is very large. Belle Isle park alone used 262,097,704 gallons, or more than enough to supply the combined villages of Delray, River Rouge, Ecorse and Highland Park. This quantity is included in the unmetered total.

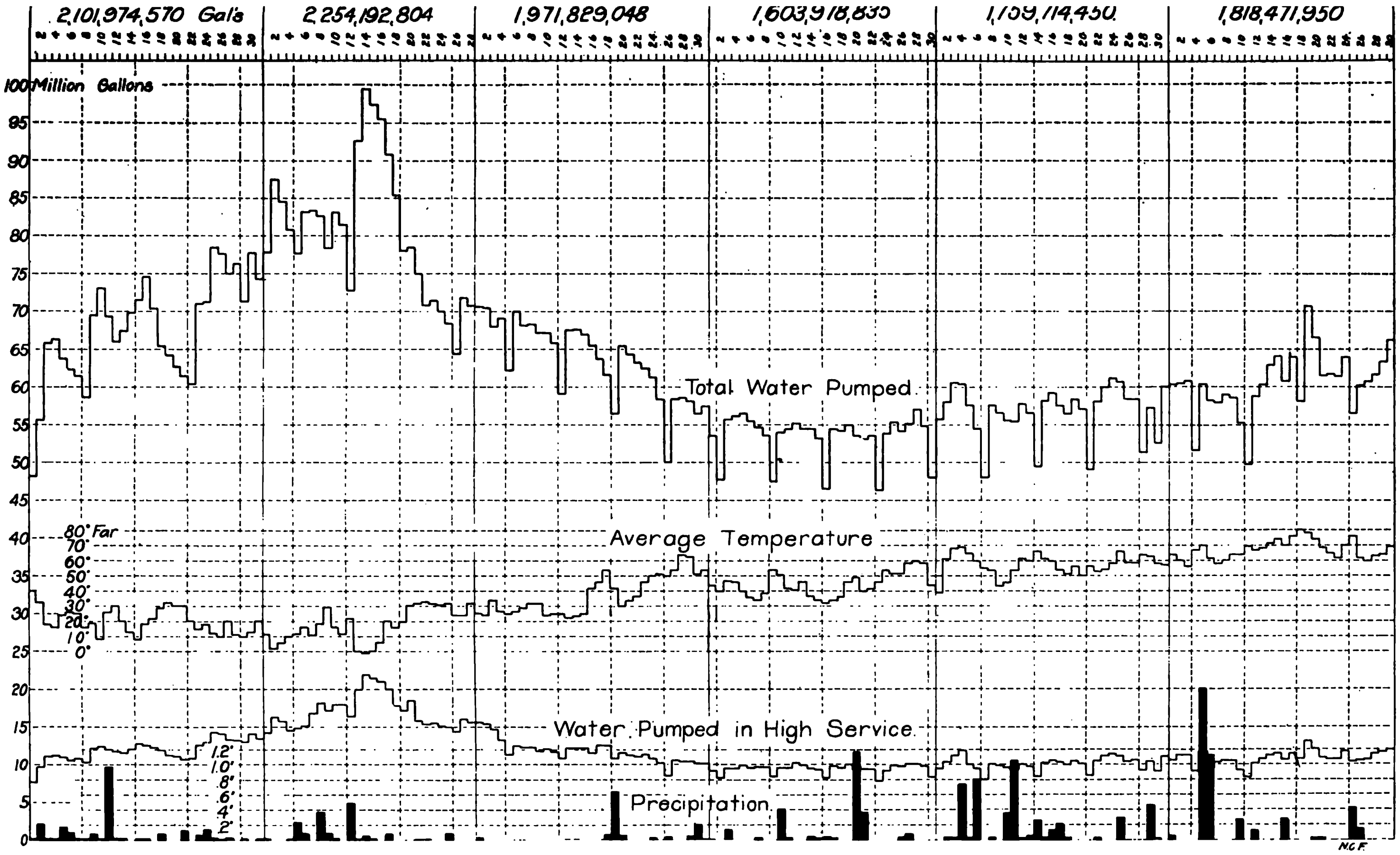
The number of gallons of water pumped each day of the year is graphically shown on the accompanying plates.

The quantity of water supplied to the high and to the low pressure systems is as follows:

	Gallons.
High Service:	
Maximum day, Feb. 14, 1905	21,975,000
Minimum day, Nov. 20, 1904	7,365,000
Average daily	10,803,818
Total for year	3,943,393,750
Low Service:	
Maximum day, Feb. 14, 1905	77,341,828
Minimum day, Nov. 24, 1904	35,739,180
Average daily	49,408,721
Total for year	18,034,183,125
Combined System:	
Maximum day, Feb. 14, 1905	99,316,828
Minimum day, Nov. 20, 1904	42,926,246
Average daily	60,212,539
Total for year	21,977,576,875
Maximum hour, 9-10 a. m., Feb. 14.............	4,548,830
Minimum hour, 2-3 a. m., Nov. 24	1,342,840

Daily Water Consumption, Average Temperature and Precipitation.




2,101,974,570 Gal's
2,254,192,804
1,971,829,048
1,603,918,835
1,709,114,450.
1,818,471,950
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
100 Million Gallons
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
80° Far
70°
60°
50°
40°
30°
20°
10°
0°
1.2'
1.0'
.8'
.6'
.4'
.2'
Total Water Pumped
Average Temperature
Water Pumped in High Service
Precipitation
N.C.F.

The low service total includes 3,516,945,024 gallons, which was delivered by the high service pumps in excess of the quantity delivered to the high service district.

Fire Protection.

The increase in the efficiency of the plant is perhaps best shown by the records of the Fire Department for the last ten years. Readings taken in 1894 on 225 fire hydrants show an average pressure of only 19.4 pounds when the fire engines were working, while the 554 hydrants used in 1904 show an average pressure of 23.5 pounds. The increase in ten years is 21 per cent.

This large increase in usefulness has been accomplished during a period of rapid municipal growth. In 1894 the average consumption was 37,396,656 gallons per day, compared with 60,212,539 in 1904-5, an increase of 61 per cent. In 1894 the estimated number of persons supplied was 241,075, compared with 358,628 for the current year, an increase of 49 per cent in ten years.

At the present rate of growth the expenditure necessary to maintain the efficiency of the works and provide for the needs of newly developing manufacturing and residence districts will be approximately $335,000 annually. The cost of construction during the past decade has averaged about $250,000 annually.

Recommendations.

I have no recommendations to make at this time other than those urged in my special report made to your honorable body on February 8, 1904, a portion of which are now being carried out.

In closing this report I desire to express my sincere appreciation of the hearty co-operation of all those who have been associated with me in the Department during the building of the tunnel. The success of this difficult undertaking has been in a large measure due to their faithfulness in the details of design and construction.

Respectfully submitted,
CLARENCE W. HUBBELL,
Civil Engineer to the Board.

REPORT OF SUPERINTENDENT OF METERS AND INSPECTION.

Detroit, July 1, 1905.

To the Board of Water Commissioners:

Gentlemen—In compliance with the rules and regulations of your honorable body, I herewith report the work done in the Meter, Inspection and Service Cocks Departments from July 1, 1904, to July 1, 1905:

NUMBER OF METERS PLACED FROM JULY 1, 1904, TO JULY 1, 1905.

	SIZES.								
	⅝ in.	¾ in.	1 in.	1½ in.	2 in.	3 in.	4 in.	6 in.	Total
In service July 1, 1904	3,109	1,109	972	315	261	112	60	19	5,957
Placed during the year ending June 30, 1905............	232	60	72	25	30	9	6	2	436
	3,341	1,169	1,044	340	291	121	66	21	6,393
Removed during the year ending June 30, 1905	244	22	31	3	11	5	1	......	317
Total number in service June 30, 1905....................	3,097	1,147	1,018	337	280	116	65	21	6,076

IN SERVICE JULY 1, 1905.

KIND.	SIZES.								
	⅝ in.	¾ in.	1 in.	1½ in.	2 in.	3 in.	4 in.	6 in.	Total
Thomson......................	3,074	1,132	975	328	264	109	52	21	5,955
Crown........................	12	10	15	7	4	3	2	......	53
Hersey	1	2	18	2	7	2	7	......	39
Worthington..................	5	3	5	......	5	2	2	.. ..	22
Union Rotary	4	......	......	......	......	......	1	......	5
Buffalo...........	1	......	......	......	......	......	......	......	1
Venturi......................	.....	......	......	......	......	......	1	......	1
Aggregate	3,097	1,147	1,013	337	280	116	65	21	6,076

Indicators attached to hydraulic elevators.. 87

METERS IN STOCK.

KIND.	SIZES.							
	⅝ in.	¾ in.	1 in.	1½ in.	2 in.	3 in.	4 in.	Total
Thomson	......	9	4	9	4	4	1	31
Crown	1	......	......	2	2	......	1	6
Hersey	......	......	9	.....	1	......	1	11
Total	1	9	13	11	7	4	3	48

Valuation of meters in stock July 1, 1905		$1,363 00
Valuation of material on hand July 1, 1905		468 02
Valuation of tools, etc., July 1, 1905		466 82
Valuation of horses, wagons, etc., July 1, 1905		459 00
Valuation of furniture, fixtures, etc., July 1, 1905		105 00
Total valuation of stock on hand July 1, 1905		$2,861 84
Valuation of meters in service July 1, 1904		$103,337 58
Deduct 2 per cent. for depreciation in value	$2,066 75	
Deduct for meters sold	41 91	2,108 66
		$101,228 92
Add amount expended 1904-5 for meters placed		5,238 75
Total valuation of meters in service July 1, 1905		$106,467 67

Four hundred and thirty-six meters were installed and three hundred and seventeen removed during the year, making a net gain of 119, and a total 6,076 in service. Two hundred and two of those removed were from places that formerly paid by meter but now pay by assessed rates. There yet remains 171 meters on such premises as against 373 last year and 1113 July 1st, 1899. The coming year will probably see all of these meters removed and installed in business places.

SUMMARY OF TOTAL AMOUNT EXPENDED IN THE METER DEPARTMENT FOR THE YEARS 1889 TO JULY 1, 1905, INCLUSIVE.

	1889	1890	1891	1892	1893	TOTAL
Meters................	$11,175 00	$18,700 00	$6,501 55	$12,371 82	$6,987 48	$ 55,735 80
Supt. and labor........	1,734 10	8,510 57	4,841 49	8,269 17	8,980 48	32,335 81
Material, tools, etc....	637 26	2,982 14	872 99	2,132 93	1,650 33	8,275 65
Freight, hauling, etc..	98 05	408 97	197 11	244 08	165 12	1,113 33
Horses, wagon, etc....	....	....	....	547 24	184 50	731 74
Aggregate........	$13,644 41	$30,601 68	$12,413 14	$23,565 24	$17,967 86	$ 98,192 33

	1894	1895	1896	1897	1898	TOTAL
Meters................	$8,824 08	$9,235 11	$10,435 76	$7,955 97	$1,790 75	$ 38,241 67
Supt. and labor........	6,672 20	6,647 89	6,340 08	6,078 78	4,531 11	30,270 06
Material, tools, etc....	1,833 01	1,384 85	1,035 15	927 90	568 99	5,749 90
Freight, hauling, etc..	201 18	71 40	91 11	67 90	13 16	444 75
Horses, wagon, etc....	383 07	248 60	238 51	330 80	187 50	1,388 48
Aggregate.... ...	$17,913 54	$17,587 85	$18,140 61	$15,361 35	$7,091 51	$ 76,094 86

	1899	1900-1	1901-2	1902-3	1903-4	TOTAL
Meters................	$2,265 70	$4,172 61	$4,801 12	$ 4,316 72	$4,401 82	$ 19,957 97
Supt. and labor........	4,223 54	6,369 45	4,597 96	5,319 54	5,144 01	25,654 50
Material, tools, etc.....	375 32	617 71	521 69	577 61	360 45	2,452 78
Freight, hauling, etc..	6 85	15 00	1 60	3 37	59	27 41
Horses, wagon, etc....	244 25	321 15	220 10	238 00	473 30	1,496 80
Aggregate.........	$7,115 66	$11,495 92	$10,142 47	$10,455 24	$10,380 17	$49,589 46

	1904-5		Total Expended Since 1889.
Meters................	$5,238 75	....	$119,174 19
Supt. and Labor.......	5,171 79	....	93,432 16
Material, tools, etc....	271 09	....	16,749 42
Freight, hauling, etc..	1 80	....	1,587 29
Phone and Printing...	88 20	....	88 20
Horses, Wagon, etc...	275 50	....	3,892 52
Aggregate	$11,047 13		$234,923 78

Inspection.

The following is a portion of the work done in this department during the year.

New connections examined—City	2,755
" " " Hamtramck	81
" " " Highland Park	42
Extensions examined	970
Buildings examined	6,855
Fixtures inspected	5,873
Let on vacant, re-occupied	620
Let on non-payment	458
Let on new connections	2,480
Building tax notices	4,736
Delinquents notified	24,250
Shut off for non-payment	542
Shut off for vacancy	983
Shut off for leaks	393
Inquiries for Assessors and Collectors	7,985
Meters read	34,190
Meter bills delivered	20,568
Examination for leaks	27,306
Leaks reported	3,724
Total	144,911

Service Cocks.

Twenty seven hundred and fifty-five service cocks were inserted during the year, a gain of 455 over the previous year. There were 96 abandoned, nearly all of which were replaced by larger ones. In the adjoining villages 667 new taps were made. The total number of taps in the city is 66,098 and in the villages 3,454, making the whole number of service connections 69,552.

TABLE showing the number and sizes of taps inserted in each ward from July 1, 1904, to July 1, 1905.

INSERTED.	WARDS.																	Total.
SIZES.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
⅝-inch	85	15	82	38	66	38	40	55	100	58	63	119	138	142	127	290	475	1,931
1-inch	80	64	29	62	28	55	15	23	21	30	19	36	29	47	65	36	105	744
2-inch	5	8	3	5	...	2	2	1	4	2	...	3	...	4	2	2	3	46
3-inch	3	...	1	2	3	1	...	1	...	1	...	...	...	2	3	...	1	18
4-inch	4	3	1	1	...	...	1	...	2	...	...	...	...	...	...	...	...	12
6-inch	2	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	4
Aggregate	179	90	116	108	97	97	59	80	127	91	82	158	167	195	197	328	584	2,755
DISCONTINUED.																		
⅝-inch	4	10	2	5	8	8	13	1	10	9	4	3	...	4	1	2	4	88
1-inch	...	3	...	2	1	...	...	...	...	...	...	...	...	...	...	1	1	8
Aggregate	4	13	2	7	9	8	13	1	10	9	4	3	...	4	1	3	5	96

Service connections in the villages of Highland Park, Delray, River Rouge, Woodmere, Ecorse and Hamtramck, July 1st, 1905. Also those transferred to Fairview which were formerly counted as being in the city. The consumption in the Villages is shown, also Belle Isle and Palmer Parks.

VILLAGES	IN USE JULY 1, 1904.						INSERTED IN 1904-5.						TOTAL.	TOTAL CONSUMPTION.
	⅝-in.	1-in.	2-in.	3-in.	4-in.	6-in.	⅝-in.	1-in.	2-in.	3-in.	4-in.	6-in.		Gallons.
Highland Park	69	51	1	1	....	1	29	13	....	....	....	....	165	22,272,448
Delray	970	98	6	3	1	4	128	22	1	1	....	....	1,234	185,230,980
River Rouge	396	10	....	....	1	....	90	1	....	....	....	....	498	40,590,968
Woodmere	634	33	1	....	1	....	212	....	....	....	....	....	881	100,086,888
Ecorse	....	....	....	....	....	....	88	1	....	....	....	....	89	4,444,616
Hamtramck	278	8	1	....	2	....	74	6	....	....	1	....	370	58,489,112
Aggregate	2.347	200	9	4	5	5	621	43	1	1	1	....	3,237	411,115,012
Belle Isle Park	....	....	....	....	....	....	....	....	....	....	....	....	....	262,097,704
Palmer Park	....	....	....	....	....	....	....	....	....	....	....	....	....	9,066,508
Aggregate	....	....	....	....	....	....	....	....	....	....	....	....	....	271,164,212
Service connections transferred from City to Fairview Village, July 1st 1905	....	....	....	....	....	....	187	26	2	....	2	....	217	....

TOTAL NUMBER OF SERVICE CONNECTIONS IN THE CITY AND ADJOINING VILLAGES, JULY 1st, 1905.

SIZES.	In Use July 1, 1904.	Added 1904-5	Discontinued 1904-5.	Total. July 1,'05
⅝ inch	46,853	1,931	88	48,696
1 "	15,905	744	8	16,641
2 "	448	46	....	494
3 "	240	18	....	258
4 "	159	12	....	171
6 "	49	4	....	53
8 "	1	....	....	1
10 "	1	....	....	1
	63,656	2,755	96	66,315
Less number transferred to the Village of Fairview, July 1st, 1905				217
Total, City				66,098
" Villages				3,454
Aggregate				69,552

Accompanying this report is a complete list of tools on hand and an itemized account of material in stock in the meter and inspection departments on the first day of July, 1905.

All of which is respectfully submitted,

T. R. PUTNAM,
Supt. Meters and Inspection.

REPORT OF CHIEF ENGINEER AT PUMPING WORKS.

Detroit, July 1, 1905.

To the Board of Water Commissioners:

Gentlemen—I have the honor to submit the Engineer's report for the year ending June 30, 1905.

The following table shows the number of gallons of water pumped, and cost of fuel for the years named:

YEAR.	GALLONS OF WATER PUMPED.	COST OF FUEL CONSUMED.	AVERAGE DAILY DELIVERED.
1852	235,840,271	....	646,411
1853	303,531,748	$ 2,129 37	931,594
1854	376,265,126	2,271 34	1,030,866
1855	542,807,364	3,325 81	1,487,143
1856	692,124,305	4,017 44	1,896,231
1857	697,190,523	3,993 20	1,909,837
1858	718,091,207	3,655 20	1,967,378
1859	782,112,587	3,194 15	2,142,774
1860	870,036,451	4,196 21	2,383,580
1861	895,129,423	4,414 07	2,452,409
1862	994,945,829	3.150 95	2,725,878
1863	1,035,798,043	4.670 86	2,837,808
1864	1,018,390,256	7,647 62	2,839,078
1865	1,049.514,887	7,372 89	2,875,383
1866	1,196,317,922	9,349 16	3,277,583
1867	1,425,535,280	10,121 82	3,905,576
1868	1,666,545,125	11,379 23	4,507,248
1869	1,946,810,325	11,247 92	4,511,809
1870	1,866,060,068	12.713 78	5.112,493
1871	2,309,150,605	14.681 05	6,301,782
1872	2,782,292,578	17,736 86	7,601,892
1873	3,198,393,948	20,233 30	8,762,723
1874	3,289,872,635	20.431 71	9,013,350
1875	4,207,454,260	21,393 98	11,527,272
1876	4,065,134,470	19,832 89	11,107,499
1877	4,213,239,790	17.433 72	11,543,123
1878	4,345,743.330	10,943 82	11,906,146
1879	5,129,599.110	11,219 51	14,053,696
1880	5,552,965.310	12,276 60	15,172,036
1881	6,543,127.968	16,556 63	17,926,877
1882	6,284,000,742	13,156 16	17,261,440
1883	7,379,327,188	16,495 99	20,217,334
1884	8,510,614,140	19,877 07	23,253,044
1885	9,970,829,580	21,341 48	27,317,341
1886	10,576,571,254	20,387 24	28,976,907
1887	13,168,859,808	35,882 83	36,079,166
1888	14,380,166,670	39,568 66	39,397.716
1889	12,875,334,453	34,413 31	35,274,888
1890	12,120,944,532	31,852 40	33,209,067
1891	12,057,261,236	33,826 86	33,033,592
1892	12,476,612,482	31,034 40	34,182,499
1893	13,877,977,208	27,479 93	38,021,855
1894	13,649,779,605	29,283 47	37,396,656
1895	14,698,451,954	32,095 00	40,269,731
1896	13,251,369,371	31,186 17	36,215,123
1897	12,928,821,326	17,355 58	35,421,428
1898	14,278,682,058	17,880 19	39,092,252
1899	16,348,032,701	19,011 67	44,789,212
1900	17,077,100,477	25,398 50	46,786,576
January 1 to July 1, 1901	8,849,732,755	16,881 31	48,893,551
July 1, 1901, to July 1, 1902	18,333,104,706	24,830 79	50,200,204
July 1, 1902, to July 1, 1903	18,757,682,360	26,909 99	51,390,911
July 1, 1903, to July 1, 1904	21,734,954,234	38,461 08	59,385,121
July 1, 1904, to July 1, 1905	21,977,576,875	32 079 27	60,212,539

The following tables show in detail the work done by each engine each month of the year:

ENGINE No. 1.

MONTHS.	Time run. H.	Time run. M.	Revolutions.	Gallons Pumped.
July	711	05	435,760	590,751,720
August	597	50	379,388	580,146,588
September	499	20	286,848	354,575,238
October	715	00	418,595	626,210,910
November	441	05	258,440	306,704,880
December	385	45	220,990	265,107,660
January	440	25	269,545	375,505,680
February	563	55	355,025	449,478,570
March	382	40	228,470	275,996,376
April	600	58	351,690	480,194,760
May	575	45	346,640	471,606,600
June	498	25	310,520	405,673,680
Total	6,412	13	3,861,411	5,181,952,662

ENGINE No. 2.

July	120	35	78,415	106,418,040
August	571	30	372,885	527,740,920
September	128	00	81,940	109,654,800
October	331	15	206,722	272,058,576
November	95	20	59,560	72,614,400
December	656	45	412,720	569,477,040
January	207	55	128,100	127,949,040
February	8	45	5,700	8,888,400
March	50	55	31,104	31,838,832
April	262	10	163,960	210,278,760
May	369	45	229,425	286,971,120
June	271	35	172,075	206,088,320
Total	3,074	30	1,942,606	2,529,928,248

ENGINE No. 3.

July	256	50	146,698	161,778,332
August	172	05	105,912	103,608,048
September	186	05	98,718	90,228,252
October	57	00	29,555	27,013,270
November	......	....	....	....
December	15	45	8,291	7,577,974
January	209	55	128,805	117,727,770
February	197	50	122,351	163,909,152
March	232	30	136,020	133,027,230
April	30	30	88,900	23,415,400
May	125	05	74,670	68,248,380
June	280	11	169,305	164,579,370
Total	1,763	46	1,109,225	1,061,203,178

ENGINE No. 4.

MONTHS.	Time run. H.	Time run. M.	Revolutions.	Gallons Pumped.
July	578	40	545,070	427,879,950
August	106	15	92,270	76,356,950
September	720	00	665,410	522,346,850
October	168	50	149,197	117,119,645
November	720	00	648,545	509,107,825
December	323	00	285,978	224,492,730
January	251	15	238,230	187,010,550
February	626	20	602,162	472,697,170
March	556	50	503,870	395,537,950
April	411	10	355,235	278,859,475
May	498	45	419,810	337,408,700
June	626	20	585,780	459,845,150
Total	5,587	25	5,091,557	4,008,662,945

ENGINE No. 5.

July	279	10	250,845	245,326,410
August	240	55	211,532	206,878,296
September	481	00	404,400	395,503,200
October	420	40	359,764	351,849,192
November	343	20	306,605	299,859,690
December	510	05	443,689	433,927,842
January	744	00	661,580	647,025,240
February	623	20	594,936	581,847,408
March	540	25	484,020	473,371,560
April	......	....	....	....
May	......	....	....	....
June	25	05	22,620	22,122,360
Total	4,208	00	3,739,991	3,657,719,198

ENGINE No. 6.

July	464	50	398,020	389,263,560
August	503	05	429,495	420,046,110
September	235	25	205,993	201,461,154
October	323	20	279,799	273,643,422
November	376	40	331,401	324,110,178
December	321	10	282,797	276,575,466
January	744	00	661,305	646,756,290
February	624	10	590,268	577,282,104
March	744	00	676,950	662,057,100
April	720	28	624,980	611,230,440
May	744	00	608,875	595,479,750
June	674	55	572,815	560,213,070
Total	6,476	03	5,662,698	3,538,118,644

TOTAL EXPENSE PUMPING WATER, 1904-1905.

Fuel coal consumed	$32,079 27
Salaries	36,143 59
Repairs boiler and engine	855 30
Engine oil and grease	507 49
Waste and rags	388 65
Boiler and engine supplies	485 24
Packing and hose	368 55
General supplies, engine and boiler	137 19
Electric light fixtures and supplies	40 77
Ice	65 38
Paint, lead and glass	56 60
Printing and stationery	14 55
Horse expense	38 14
Miscellaneous	158 86
Kerosene and gasoline	11 75
Boiler inspection	36 00
Telephone	84 00
Doctors service	225 00
Freight charges	7 02
Feed and bedding, horse	82 74
Towel supply	36 22
Street car tickets	4 00
Wagon Repairs	5 00
Hoisting apparatus repairs	114 43
Total	$71,945 74

The cost of fuel per million gallons pumped was $1.46 and per million gallons pumped 100 feet high was $1.18. The table shows that the amount of water pumped during the year was 21,977,576,875 gallons, making the daily average 60,212,539, which is an increase of $\frac{1}{10}$ of one per cent compared with the preceeding year.

The total expense during the year for pumping water, including maintainance, heating station, library and greenhouse, hoisting coal, etc., was $71,945.74, thus making the cost per million gallons pumped, $3.05, which is nine per cent less than the preceeding year and should be very gratifying to the board.

The station duty of coal consumed for all purposes for the year was 86,542,628 foot pounds.

The engines are all in good working order with the exception of No. 2 engine foundation, but I hope that the Board will give this matter their immediate attention, as now is the time when this should be attended to, for it required five of the six engines to supply the demand last winter.

The new Allis Chalmers pumps are now undergoing alterations and when completed I expect will then be in first-class condition which will be about September 15th.

The Boilers and steam pipes are in good working order.

I hope that the Board will consider favorable the necessity of a new battery of boilers and stokers as we are about up to our water tube boiler capacity, thus giving us an additional steam pipe for the engine on the high service which would be necessary in case of repairs or accident to the present one.

The Buildings are in a fair condition.

Respectfully submitted,

URIAH GOULD,
Chief Engineer.

REPORT OF THE SUPERINTENDENT OF CONSTRUCTION.

To the Honorable Board of Water Commissioners:

Gentlemen—I respectfully submit the report of the Supt. of Construction for the work done in the Construction Department from June 30th, 1904 to June 30th, 1905.

Work performed at the Pumping Station from July 1st, 1904 to July 1st, 1905.

Emergency Well, work thereon	$ 895 46
10 foot Conduit, work thereon	155 74
8-ft. Conduit, work thereon	64 57
Basin Inlet No. 2, work thereon	207 24
Basin Inlet No. 3, 7 foot Thimbles and work	2,272 79
Basin Inlet No. 4, 8 foot Thimbles and work	2,034 21
Junction Well No. 3, Thimbles and work	158 15
Junction Well No. 4, setting gates, Thimbles and work	1,501 35
Strainer Well No. 5,	101 29
21 foot Junction Well and Work	244 66
Moving Derrick and Pile Driver	251 74
Work on Coal Sheds	239 80
Work on the Grounds	236 82
Pumping water from Wells and Conduits	770 49
	$9,134 31

Distribution System.

Inside the city we laid 51,436 feet and discontinued 2,238 feet making a net increase inside of the city of 49,198 or $9\frac{1678}{5280}$ miles.

Outside the city we laid 49,300 feet or $9\frac{1780}{5280}$ miles.

The net increase in the entire systen is 98,498 feet or $18\frac{3458}{5280}$ miles.

The Board now owns 499,575 feet or $94\frac{3255}{5280}$ miles outside of city and inside 3,000,806 feet or $568\frac{1766}{5280}$ miles making a total pipe in system of 3,500,381 feet or $662\frac{5021}{5280}$ miles of the different sizes as follows:

Size of Pipe, Inches.	Measured Length in Feet to July, 1904.	Length in Feet Laid from July, 1904, to July, 1905.	Discontinued Feet from July, 1904, to July, 1905.	Total Length in Feet to July, 1905.
45	103	....	....	103
42	74,215	8,972	....	83,187
36	7,611	....	....	7,611
30	54,558	....	....	54,558
24	84,840	....	....	84,840
20	393	....	....	393
18	87	....	....	87
16	55,909	....	....	55,909
12	53,174	1,819	....	54,993
10	178,368	4,113	....	182,481
8	366,181	25,102	....	391,283
6	1,587,331	58,141	1,205	1,644,267
4	871,653	2,536	459	873,730
3	62,867	53	574	62,346
2	4,593	....	....	4,593
	3,401,883	100,736	2,238	3,500,381

SHUT OFF GATES IN SYSTEM JULY 1ST, 1905.

SIZE.	42-IN.	36-IN.	30-IN.	24-IN.	20-IN.	18-IN.	16-IN.	12-IN.	10-IN.	8-IN.	6-IN.	4-IN.	3-IN.	TOTAL.
Murdock	5	...	11	16	...	...	27	47	187	455	1,622	1,308	11	3,684
Flowers	20	...	9	18	...	...	...	...	39	51	245	437	20	839
Galvin	...	1	7	12	...	...	21	...	13	31	170	247	1	503
Michigan Brass and Iron Works	10	...	9	2	11	...	13	12	63	152	776	110	...	1,159
Pittsburgh	...	...	...	15	...	2	1	1	10	12	31	119	...	191
Roe Stephens (Scott)	...	...	...	...	...	...	...	6	1	6	43	....	...	56
Eddy	...	...	...	...	...	...	...	...	15	3	6	9	...	33
Scowden	...	...	...	...	...	...	...	...	7	18	48	12	...	85
Ludlow	...	...	...	...	...	...	...	...	1	2	9	5	...	17
St. Louis	...	...	...	...	...	...	...	3	....	....	....	....	...	3
Detroit Water Works	13	3	3	4	...	...	5	20	55	145	670	262	...	1180
Prong	...	...	...	...	..	...	...	...	....	....	1	....	...	1
Boston	...	...	...	...	...	...	...	...	....	1	1	....	...	2
Newport	...	...	...	...	...	...	...	...	....	....	....	1	...	1
Name Unknown	...	..	...	...	...	...	...	...	....	3	9	32	1	45
TOTAL	48	4	39	67	11	2	67	89	391	880	3,631	2,537	33	7,799

GATES SET FOR SHUT-OFFS FROM JULY, 1904, TO JULY, 1905.

NAME.	SIZES.						
	4-in.	6-in.	8-in.	10-in.	12 in	42-in.	TOTAL.
Detroit Water Works—City	28	85	23	13	7	5	161
Murdock—City	....	....	1	....	....	....	1
Scott—City	....	....	....	1	....	....	1
Mich. Brass and Iron Works—City	....	....	1		1	...	2
Pittsburgh—City	....	....	1		....	...	1
Detroit Water Works—Delray	..	3	...		....	....	3
Detroit Water Works—Woodmere	1	1	...		....	....	2
Detroit Water Works—River Rouge	...	17	...		....	....	17
Detroit Water Works-Highland Park	...	5	...		....	....	5
Detroit Water Works—Hamtramck	2	....	..		....	....	2
Detroit Water Works—Fairview	...	5	10		....	....	15
Detroit Water Works—Fair Grounds	4	....	6		....	....	10
Total	35	116	42	14	8	5	220

SHUT-OFF GATES DISCONTINUED FROM JULY, 1904, TO JULY, 1905.

NAME.	SIZES				
	4-in.	6-in.	8-in.	10 in.	TOTAL.
Murdock	11	5	......	1	17
Galvin	3	......	......	......	3
Scowden	......	......	......	1	1
Mich. Brass and Iron Works	.....	1	......	......	1
Flowers	.....	......	1	......	1
Eddy	.....	......	1	......	1
Total	14	6	2	2	24

TOTAL AND AVERAGE COST OF WELLS BUILT OVER GATES.

OVER GATES OVER OLD LINES.		Average.
2 gate wells, 3"	$ 40 92	$20 46
195 gate wells, 4", 6" and 8"	4,486 54	23 00
16 gate wells, 10", 12", 16" and 24"	429 75	26 85
213	$4,957 21	

OVER GATES OVER NEW LINES.		Average.
162 gate wells, 4", 6" and 8"	$ 3,414 10	$ 21 07
15 gate wells, 10", 12" and 16"	342 49	22 82
4 gate wells, 42"	1,465 94	366 48
181	$5,222 53	

The following is a statement of examinations, operations and repairs of gates, etc.

6,330	gates examined.
342	gates repaired.
5,951	gates operated for flushing dead ends.
564	shut-offs for pipe lines and repairs.
53	tees set for fire department.
3,561	wells in system.

LEAKS IN MAINS FROM JULY, 1904, TO JULY, 1905.

SIZES.	COST.
4 inch, 6 inch and 8 inch	$ 908 69
10 inch and 12 inch	6 84
24 inch and 42 inch	185 28
	$1,100 81

LEAKS IN SERVICE CONNECTIONS.

MONTHS.	NO	COST.
1904		
July	31	233 45
August	21	61 49
September	17	53 21
October	16	53 20
November	37	170 47
December	33	122 09
1905		
January	30	85 98
February	34	95 65
March	51	320 78
April	88	367 81
May	42	252 74
June	40	131 44
Total	440	$1,948 76

COMPLAINTS.

MONTHS.	COMPLAINTS.			SERVICE.	
	No Water.	Bad Water.	Short Supply	Let On.	Shut Off.
1904					
July	7	16	7	8	18
August	4	16	2	3	15
September	4	......	......	3	6
October	....	6	2	4	5
November	3	......	5	1	16
December	1	2	......	1	7
1905					
January	4	......	4	3	7
February	9	......	......	1	12
March	6	4	5	5	2
April	2	9	3	7	12
May	3	14	2	7	8
June	2	22	2	3	16
Total	45	89	32	46	124

PIPE LAID FROM JULY 1st, 1904, TO JULY 1st, 1905.

Date.	LOCATION OF PIPE.	Feet.	Size.	COST OF CONSTRUCTION.											
				Pipe.	Specials.	Lead.	Gates. No.	Gates. Cost.	Sundries.	Gate-wells.	Hauling.	Re-paving.	Sup. & Eng.	Labor.	Total Cost.
July 9, 1904	Alger, from 21 ft. e of e of Cameron to 409 ft w. of w. of same	455	6 in.	$191 86	$11 49	$18 27	....	$26 00	$6 32	$21 13	$8 25	.....	$22 75	$126 50	$482 57
Oct. 13, 1904	Alger, from 21 ft. w of e of Cameron to 208 feet e of of same	229	6 in.	96 56	8 11	11 34	..	24 80	5 10	20 08	3 75	.....	11 45	85 25	266 44
May 1, 1905	Alexandrine, from 15 ft. w of e of Collins to 21 ft. of e Moran	772	8 in.	405 55	49 34	57 00	....	76 40	20 85	80 48	32 97	.....	38 60	487 98	1,249 17
June 14, 1905	Alger from 207½ ft of e of Cameron to 297½ ft. e of e of same	90	6 in.	34 37	....	4 75	....	....	15	....	4 18	.....	4 50	27 68	75 58
June 15, 1905	Antionette, from ft. e of e of Second to 24 ft. e of w of Third Ave	774	6 in.	294 42	7 02	33 25	....	29 00	20 84	38 13	14 77	.....	38 70	529 66	1,005 79
Nov. 5, 1904	Belvidere from 172 ft. s of s of Mack to 484 ft. s of s of same	312	6 in.	131 57	5 07	11 34	....	....	4 72	....	7 03	.....	15 60	138 65	318 98
Nov. 28, 1904	Boulevard, west from 30 ft. s of n of same to 576 ft. s of s of Fort Street	658	6 in.	277 47	18 28	25 08	....	13 40	4 58	22 66	8 53	.....	32 90	321 25	724 15
Sept. 13, 1904	also from 20 ft s of s of n Boulevard to 207 ft. s of same	87	6 in.	36 68	....	3 65	..	......	21	....	2 75	.....	....	22 25	65 54
Apr. 10, 1905	Boulevard, north from 42 ft. e of w of south side to 335 ft. w of w of Second Street	375	6 in.	141 11	6 36	12 54	....	24 90	6 07	17 96	9 93	.....	18 75	141 77	379 39
June 15, 1905	Burlingame, from 517 ft. e of e Third Third to 44 ft. w of e of Hamilton Boulevard	1,463	6 in.	557 15	....	38 00	....	29 00	2 55	40 38	26 33	.....	73 15	825 66	1,592 22
July 25, 1904	Cass, from 2 ft. s of n of Milwaukee to 10 ft. s of s of Boulevard	355	8 in.	207 28	4 00	21 92	....	32 00	2 34	20 42	5 50	.....	17 75	162 59	478 80
Oct. 14, 1904	Canton, from 3 ft. s of n of Boulevard to 31 feet n of s of Medbury	304	6 in.	128 18	....	15 12	....	13 40	1 89	20 13	3 75	.....	15 20	96 65	294 32
Dec. 17, 1904	Campbell, from 276 ft. n of n of Herbert to 336 ft. n of same	60	6 in.	21 94	....	418	....	....	46	....	2 75	.....	3 00	24 00	56 33
Dec. 12, 1904	Canton, from 23 ft. n of s of Lambert to 210 ft. n of n of same	233	6 in.	85 19	4 05	8 36	....	24 80	2 58	18 39	2 36	.....	11 65	91 97	219 35
Dec. 12, 1904	Congress, Brooklyn, River, Stanton and Fort Streets	6,032	42 in.	45,337 03	1,686 50	2579 72	....	3,365 01	3277 99	1,780 20	5572 59	.....	326 60	50,161 01	114,086 65
Apr. 11, 1905	Commonwealth, from 32½ ft n of s of Calumet to 172 ft 8 in. n of n of same	198	6 in.	74 85	3 20	12 54	....	24 90	6 81	18 79	6 74	....	9 90	93 36	251 09
June 3, 1905	Canfield, from 32 ft. e of w of Concord to 123 ft. w of same	155	6 in.	58 81	4 42	9 50	....	13 40	5 69	19 81	4 00	.....	7 75	38 25	161 63

June 1, 1905	Dragoon, from 19 ft. s of s of Bayonet to 129 ft. n of n of same.. ...	208	6 in.	$78 48	....	$9 50	....	$13 40	46	19 68	6 78	.....	$10 40	$47 18	$185 88
June 3, 1905	Durand, from 116 ft. e of e of Seyburn to 32 ft. w of w of same ..	148	6 in.	56 13	......	4 75	....	13 40	80	19 82	2 74	.....	7 40	38 09	143 13
June 6, 1905	Ellery, from 2 ft. s of n of Ferry to 18 ft. s of n of Weitzel Court ...	161	6 in.	61 10	2 98	5 95	...	13 40	84	19 50	1 61	.....	8 05	35 75	149 18
Aug 25, 1904	Field, from s line of Mack to 203 ft. s of s of Charlevoix...............	1,928	6 in.	813 01	27 61	84 04	....	29 00	5 54	45 19	13 25	.....	96 40	529 00	1,648 04
Oct. 7, 1904	Fordyce, from 19 ft. s of n of Haigh to 364 ft. n of n of same......	383	6 in.	161 50	3 04	17 01	....	24 80	5 50	19 75	3 26	.....	19 15	128 02	382 08
Nov.16, 1904	Ferry, from 26 ft. e of w of Woodward to 44 ft. w of e of Cass.. ...	590	6 in.	248 80	18 46	24 02	....	26 80	9 99	41 29	19 28	5 22	29 50	409 32	832 68
Nov.25, 1904	Fort, s from 31 ft. w of e of Vinewood to 38 ft. e of e of 19th St.....	2,920	42 in.	21,785 02	420 79	1,375 22	. ..	962 30	319 80	464 85	1,104 66	317 52	146 00	17,116 47	44,012 13
May 12, 1905	Frontenac Boul., from 14 ft. n of s of Sylvester to 263 ft. s of s of same.	278	6 in.	104 63	4 20	7 13	....	24 90	4 21	18 98	4 18	.....	13 90	69 01	251 14
Dec. 1904,	also from 28 ft. s of of Sylvester o 440 ft. n of n of same	468	6 in.	171 11	7 26	14 63	....	24 80	4 57	17 99	8 57	....	23 40	178 86	451 19
Nov.30, 1904	Grand River, from 33 ft. e of 16th to 34 ft. of n Warren	205	10 in.	134 92	8 50	....	....	....	part	of "Sub	way."	.....	....	....	143 42
July 14, 1904	Helen, from 34 ft. n of s of Gratiot o 267 ft of same................	300	6 in.	126 51	7 18	14 62	...	14 50	2 63	21 29	8 83	.....	15 00	62 25	272 81
July 11, 1904	Hurlbut, from 357 ft n of n of Mack to 557 ft. n of same	200	6 in.	84 34	5 28	7 31	..	....	53	....	3 75	.....	10 00	60 50	171 71
July 19, 1904	Hammond, from ft. s of n of Stark to ft. s of s of same......... ..	85	6 in.	35 84	1 35	3 65	....	11 50	4 22	... .	3 08	.....	....	23 00	82 64
Aug. 4, 1904	Harper from 48 ft. w o e of Cadillac to 149 ft. e of w of Hurlbut...	5½ 549	4 in 6 in	232 89	10 74	21 92	....	26 00	4 76	22 19	7 55	.....	27 45	220 68	574 18
Aug 13, 1904	Holcomb, from 18 ft. n of s of Goethe to 100 ft. s of s of same and 52 ft. on Goethe..................	170	6 in.	71 69	8 01	7 31	..	26 00	5 37	23 17	5 68	.....	8 50	65 50	221 23
Aug 11, 1904	Hastings, from 20 ft. n of n Trombley to 49 ft. s of Boulevard.. ... also in Trombly from 1 ft. e of w of Hastings o 9 ft. w of e of same also in Milwaukee from 21 ft. e of w of lastings to ft w of e of same	1,110 40 28	12 in 10 in 10 in	1,203 79	62 87	116 93	....	& valve 311 60	15 98	140 05	14 50	.....	55 50	886 75	2,807 97
Dec. 1, 1904	Hubbard, from 57 ft. n of n of Michigan to 33 ft n of s of Myrtle Boul	681	10 in.	448 18	30 90	57 70	....	26 00	6 97	21 26	20 75	.....	34 05	422 96	1,068 77
Apr. 18, 1905	Holcomb, from 302 ft. s of s of Medbury to 645 s of sam	343	6 in.	130 60	1 04	12 54	....	11 50	1 50	....	6 26	.....	17 15	110 00	290 59
Apr. 27, 1905	Howell, from 22½ ft. n of s of Horatio to 125 ft. of of same......	147½	6 in.	54 23	1 30	8 36	. . .	24 90	5 01	17 91	5 23	.....	7 40	35 64	159 98
Apr. 28, 1905	Hooker, from 280 ft. e of e of Grand River to 376 ft e of e of same.....	96	6 in	36 66	....	4 18	...	....	18	....	2 75	.....	4 80	27 76	76 33
May 15, 1905	Helen, from 7 ft. s of n of Kercheval to 333 ft. n of n of same..........	340	6 in.	129 84	....	11 88	....	13 40	1 49	19 29	3 25	. ...	17 00	72 86	269 01

PIPE LAID FROM JULY 1st, 1904 TO JULY 1st, 1905.—Continued.

Date.	LOCATION OF PIPE.	Feet.	Size.	COST OF CONSTRUCTION.											
				Pipe.	Specials.	Lead.	Gates.		Sundries.	Gate-wells.	Hauling.	Re-paving.	Sup. & Eng.	Labor.	Total Cost.
							No.	Cost.							
Sept.17 1904	Harper, alley s of and from e line of Beaubein to 116 ft. e of same	116	6 in	$ 48 92	$4 86	$7 56	....	$24 80	$4 48	$22 17	$2 82	.....	$5 80	$41 75	$163 16
May 17,1905	Harper, alley s of & from 29 ft. e of w of Antoine to 336 ft w of w of same	365	6 in.	139 38	....	14 25	....	13 40	3 70	19 55	3 41	.....	18 25	97 29	308 23
June 8, 1905	Holbrook, from 171 ft. e of w of Mt. Elliott to 479 ft. e of same.........	308	6 in.	116 85	2 44	14 25	....	....	59	....	4 86	.....	15 40	80 00	234 39
June 3, 1905	Herbert, from 27 ft. e of w of Military to 319 ft. e of e of same..	358	6 in.	135 95	4 28	14 25	....	24 90	4 84	19 27	4 85	.....	17 90	78 43	304 67
June 9, 1905	Helen, from 14 ft. s of n of Harper to 207 ft. n of same	221	6 in.	84 38	6 50	9 50	....	24 90	6 04	18 94	4 50	.....	11 05	61 00	226 81
June22,1905	Haigh, from 2 ft. e of e of Brush to 467 ft. e of same	465	6 in.	178 02	1 04	19 00	....	11 50	3 89	....	7 24	.....	23 25	120 50	364 44
Oct. 22,1904	Isabella, from 18 feet. n of s of Mich. to 22 ft. s of n of Hyacinthe also on "E" Street from w line of Isabella to 24 ft. e of same........	1066 321	10 in. 6 in.	823 47	128 11	79 38	....	65 40	11 13	67 09	29 71	.....	55 00	514 85	1,774 14
Nov. 5, 1904	Jackson, from 16 ft. w of e line of Scotten to 32 ft. w of e of LaSalle	386 6 in.	6 in.	162 98	6 89	15 12	...	26 84	1 68	41 21	6 07	.....	19 33	150 68	430 71
Feb. 21,1905	Jefferson, at Field Ave for drain for dividing gate, etc................. also for 42 in. gate well...........	23 29 24	6 in. 3 in. 3 in.	13 26 3 86	4 92 40	8 36	....	13 40	3 66	31 56	10 25 1 38	....	2 60 1 20	250 01 67 86	338 02 74 70
June 1, 1905	John R., from 20 ft. 6 in. s of n of Leicester Court to 12 ft s of n of Mott	347	6 in.	181 37	9 16	14 25	....	26 80	2 14	37 56	5 22	.....	17 35	114 47	358 32
July 9, 1904	King, from 313 ft. w of w of Cameron to 403 ft. w of same..........	90	6 in.	37 95	3 04	3 65	....	....	18	....	3 26	.....	....	28 50	71 58
July 28,1904	Kercheval, from e line of Maxwell to 5 ft e of w of Seminole.........	180	8 in.	105 10	14 04	7 31	....	....	3 03	....	3 26	.....	9 00	99 59	241 33
Aug. 3, 1904	Kercheval, from 17 ft. 3 in. w of e of Shephard to 136 ft e of w of Seyburn	184 18	8 in. 6 in.	112 91	11 96	10 96	....	....	79	....	3 26	.....	9 85	83 59	233 32
Sept.10 1904	Kercheval, from 24 ft. e of w of McClellan to 25 ft. e of w of Bowen	425	6 in.	179 22	10 14	21 92	....	26 80	5 24	45 19	8 62	.....	21 25	134 25	452 63
Oct. 3, 1904	King, from 22 ft. 6 in. e of w of Oakland and 17 ft s of n of King, going east 214 ft.	256 8 in.	6 in.	108 26	6 94	15 12	...	13 40	13 26	19 63	4 43	.....	12 80	103 16	297 00
Oct. 17, 1904	Knox, from 33 ft. 6 in. n of n of Holbrook to 39 ft. 10 in. n of s of Gillet also in Gillet from 14 ft. e of w of Knox to 30 ft. e of w of same.....	443 44 5	6 in. 6 in. 4 in.	206 61	11 63	20 79	....	26 80	2 22	39 26	5 62	.....	24 35	175 36	512 63

June 2, 1905	LeGrand, from 25 ft. 6 in. e of w of McClellan to 536 ft. e of e of same	577	6 in.	$220 34	$2 60	$19 00	....	$24 90	$3 88	$19 53	$9 78	.....	$28 85	$140 06	$468 94
June 16 1905	Leicester Court, from 22 ft. e of e of Oakland to 350 ft. w of same......	372	6 in.	141 67	2 60	14 25	....	24 90	5 49	19 89	5 25	.....	18 60	100 50	333 15
July 9, 1904	McGraw, from n line of Grand River to 24 ft. w of e of Winslow........	354	6 in.	149 28	10 14	14 62	...	14 50	2 77	20 58	8 76	.....	17 70	164 25	402 60
July 27, 1904	Merrick, from 25 ft. e of w of Stanton to 26 ft. e of w of 15th.........	663	8 in.	387 11	36 32	43 85	....	64 00	7 78	43 26	5 38	.....	33 15	280 25	901 10
Sept. 1, 1904	Meldrum, from 792 ft. s of s of Berlin to 1031 ft. s of same............	239	6 in.	100 78	....	7 31	...	....	31	....	5 13	.....	11 95	48 75	174 23
Oct. 21, 1904	Morrow, from 39 ft. s of n of Clay to 70 ft. n of n of Marston...........	645 4	10 in 4 in	491 05	24 13	32 13	....	37 40	3 60	20 53	14 87	.....	32 25	330 54	986 50
Nov. 9, 1904	May, from 8 ft. s of Gratiot to 278 ft. 6 in. n of n of same	286 6 in.	6 in.	120 81	5 07	11 34	....	21 19	5 30	24 80	6 00	.....	14 33	127 14	335 98
Dec. 2, 1904	Milwaukee, from 27 ft. e of w of 15th St. to the old pipe.....	318	6 in.	134 10	5 04	12 54	....	....	1 08	22 17	6 71	.....	15 90	122 16	319 70
Dec. 2, 1904	Myrtle Boul. from 145 ft. w of w of Hubbard to 32 ft w of e of Vinewood	530	10 in.	344 86	29 04	41 80	....	37 40	6 24	21 62	17 50	.....	26 20	445 15	969 81
Dec. 8, 1904	Myrtle Boulevard and Vinewood connecting 10 in. line	12 10	8 in 4 in	8 27	26 22	12 54	....	32 40	4 81	26 90	2 75	.....	....	411 18	525 07
Dec. 17, 1904	McDougall, from 92 ft 6 in. s of s of Theodore to 154 ft 6 in s of s of same	62	6 in.	22 67	3 70	4 18	....	....	21	....	1 38	.....	3 10	22 83	58 07
Dec. 5, 1904	Mohawk, from 20 ft. e of w of McKinley to e line of Vinewood.....	420	6 in.	153 56	....	16 72	....	13 40	3 31	40 74	8 38	.....	21 00	144 25	401 36
Apr. 4, 1905	McDougall, from 25 ft. n of s of Hancock to 124 ft n of n of same......	167	6 in.	61 68	6 26	8 36	....	24 90	6 32	18 78	5 21	.....	8 35	64 18	204 04
Apr. 28, 1905	Mack, from 85 ft. e of e of Iroquois to 2 ft. e of w of same.............	173	6 in.	63 00	15 10	8 36	....	....	21 53	45 43	20 47	.....	8 65	566 25	748 79
June 3, 1905	Meldrum, from 59 ft. s of n of Gratiot to old pipe s of Forest.........	907	6 in.	345 22	3 68	38 00	....	13 40	3 49	19 81	6 00	.....	45 35	193 25	668 20
June 1, 1905	Maxwell, from 150 ft. n of n of Conger to s line of Duncan...	847	6 in.	322 30	5 72	28 50	....	26 80	3 90	38 68	7 22	.....	42 35	233 50	708 97
June 2, 1905	Military, from 168 ft. n of n of Southern to 32 ft. s of n of same......	200	6 in.	75 61	3 88	9 50	....	13 40	81	18 94	5 19	.....	10 00	68 42	205 75
June 6, 1905	McDougall, from 161 ft n of n of Hancock to 282 ft. n of same	121	6 in.	46 20	....	4 75	....	....	22	....	2 35	.....	6 05	31 67	91 24
June 7, 1905	Meldrum, from 1078 ft. s of s of Berlin to 246 ft. n of n of Waterloo...	218	6 in.	82 86	94	9 50	....	....	51	....	2 82	.....	10 90	45 25	152 78
July 6, 1904	Oakland, from 15 ft. s of n of Holbrook to 243 ft. s of s of same...	296	10 in.	224 68	4 21	18 27	....	11 50	6 71	....	7 50	.....	14 80	97 57	385 24
May 26, 1905	Owen, from end of pipe 134 ft. w of Oakland to 187 ft. w of w of same	53	6 in.	20 23	....	2 00	....	....	12	....	1 88	.....	2 65	13 47	40 35
June 12, 1905	Oakland, from 14 ft. s of s of Mott to 20 ft. s of n of same	652	10 in.	447 48	4 30	47 50	...	....	1 80	....	26 20	... .	32 60	216 75	776 63
July 13, 1904	Palmer, from 336 ft. w of w of Mt. Elliott to 786 ft. w of same........	449	6 in.	189 37	3 38	18 27	....	....	1 04	....	7 97	.....	22 45	98 08	340 56

PIPE LAID FROM JULY 1st, 1904, TO JULY 1st, 1905 —CONTINUED.

Date.	LOCATION OF PIPE.	Feet.	Size.	COST OF CONSTRUCTION.											
				Pipe.	Specials.	Lead.	Gates.		Sundries.	Gatewells.	Hauling.	Repaving.	Sup. & Eng.	Labor.	Total Cost.
							No.	Cost.							
July 14, 1904	Parker, from 635 ft. n of n of Mack to 876 ft. n of same..............	241	6 in.	$101 62	....	$10 96	....	....	$ 34	....	....	.....	$12 05	$51 50	$176 47
July 22, 1904	Parker, from 129 ft. n of n of Waterloo to 405 ft. s of s of same........	595 12	6 in 4 in	253 93	$12 84	21 92	...	$23 00	6 91	....	$5 13	.....	29 75	146 25	499 73
Aug 25, 1904	Palmer, from w line of Collins to 190 ft. w of same.....................	190	6 in.	80 12	6 92	7 31	....	11 50	1 92	$21 94	4 23	.....	9 50	45 00	188 44
Aug 30, 1904	Parkman, from 46 ft. w of e of 12th to 544 ft. e of same.... .... also in Pallister, from e line of 12th to 45 ft. w of same......	590 45	6 in 6 in	267 77	6 76	25 58	....	13 40	1 90	22 47	8 38	.....	31 75	169 25	547 26
Oct. 13, 1904	Pollard, from 37 ft. w of e of St. Aubin to 224 ft. w of e of same....	261	6 in.	110 05	12 27	15 12	....	24 80	6 87	19 46	4 59	.....	13 05	115 34	321 55
April 6, 1905	Pontiac, from e line of McClellan to 245 ft. e of e of same...........	245	6 in.	92 79	2 12	12 54	....	24 90	5 59	18 62	5 28	.....	12 25	71 18	245 27
Apr. 23, 1905	Palmer, from e line of Helen to 143 ft. e of same....................	148	6 in.	55 75	2 34	8 36	....	24 90	4 71	19 82	5 02	.....	7 40	34 75	163 05
Aug. 11, 1904	Regular, from 40 ft. e of w of Dragoon to 159 ft. w of w of same......	199	6 in.	83 91	4 86	7 31	....	26 00	4 18	21 28	5 63	.....	9 95	46 10	209 22
Aug 31, 1904	Reed Place, from 335 ft. w of w of Greenwood to 565 ft. w of same...	230	4 in.	58 19	1 69	7 31	....	....	45	....	5 13	.....	11 50	55 50	139 77
Aug 28, 1904	Seminole, from 15 ft. n of s of Kercheval to 68 ft. n of n of same....	133	6 in.	56 03	3 87	3 65	....	14 50	5 48	20 42	4 63	....	6 65	97 59	212 82
Sept. 15, 1904	St. Paul, from 25 ft e of w of Bowen to e line of McClellan.	386	6 in.	162 77	1 82	18 27	....	13 40	1 16	21 63	5 62	.....	19 30	108 00	351 97
Sept 13, 1904	Stanton, from 297 ft. n of n of McGraw to 688 ft. n of n of same....	391	6 in.	164 87	6 76	14 62	....	....	73	....	5 82	.....	19 55	97 75	310 10
Nov. 25, 1904	Sheridan, from 97 ft. n of n of Ferry to 13 ft. n of s of Hendrie...	726 9 in.	6 in.	306 46	3 04	27 17	....	26 80	3 17	40 03	7 00	.....	36 35	238 17	688 19
May 1, 1905	Second, from 16 ft. n of s of Forest to 30¼ ft. n of n of Prentiss.......	227	6 in.	84 59	5 92	12 54	....	13 40	2 02	20 2	13 05	.....	11 35	125 52	288 59
June 2, 1905	Southern, from 25 ft. e of w of Military to 178 ft. w of w of same.. ..	203	6 in.	77 51	3 02	9 50	....	....	25	....	1 38	.....	10 15	68 18	169 99
June 3, 1905	Seyburn, from 61 ft. s of n of Kercheval to 23 ft. s of Durand.......	315	6 in.	119 53	3 88	14 25	...	13 40	1 44	19 99	4 15	.....	15 75	71 50	263 89
May 3, 1905	Stanton, from 24 ft. s of n of Milwaukee to 3 ft. n of s of Boulevard....	394⅛	6 in.	147 22	7 32	14 28	....	26 80	95	39 09	5 05	.....	19 73	108 36	368 80
	Second and Calhoun for connection.....................	32⅛	6 in.	12 41	7 84	4 75	....	14 50	41	19 91	1 88	.. .	1 65	28 67	92 02

	Seyburn, from 20 ft. s of n of Durand to 110 ft. n of same................	180	6 in.	$49 64	$2 34	$4 75	....	$11 50	$4 84	....	$5 63	.....	$6 50	$22 25	$106 95
Aug.13, 1904	Thirty-first, from 150 ft. s of s of Warren to 10 ft. n of n of same...	160	6 in.	67 47	3 87	7 31	...	....	82	... .	2 75	.....	8 00	68 56	158 78
Aug.29, 1904	Townsend, from 12 ft. n of s of Mack to 9 ft. n of s of Goethe...........	847	8 in.	494 54	15 13	47 50		64 00	2 36	$45 70	5 75	.....	42 35	221 50	938 83
Sept. 6, 1904	Thirtieth, from 293 ft. s of s of Herbert to 392 ft. s of same	99	6 in.	41 74	....	3 65	...	....	18	....	3 75	.....	....	31 25	80 57
Aug. 30,1904	Twelfth, from 26 ft. s of n of Pallister to 22 ft. n of s of Parkman....	301	8 in.	175 75	11 96	21 92	....	21 00	1 40	22 68	6 50	....	15 05	76 75	353 01
Oct. 28, 1904	Twenty-fifth, from 4 ft. 6 in. n of n of Warren to 365 ft. n of n of same.	365	6 in.	153 91	....	13 23	...	....	1 85	....	5 63	.....	18 25	119 62	312 49
Nov. 15,1904	Twenty-first, from 38 ft. s of n of Fort to 4 ft. n of n of River	409	12 in.	424 54	....	25 87	....	....	2 33	....	8 44	.....	20 45	360 31	841 94
Dec. 16,1904	Torry, from 20 ft. e of w of Scotten to 30 ft. w of e of Lovett........ also from 30 ft. w of e of Lovett to w line of same	381 36	8 in. 6 in.	206 04	20 46	33 44	....	47 80	3 28	60 56	8 50	.....	20 85	308 42	709 35
Dec. 8, 1901	Twenty fifth, from 127 ft. s of s of Hudson to 110 ft. s of s of Kirby..	485	6 in.	177 32	....	20 90	....	13 40	1 53	20 04	13 46	.....	24 25	139 50	410 40
Dec.10, 1904	Twenty-eighth, from 46 ft. s of s of Warren to 220 ft. n of n of same..	370	6 in.	135 28	4 27	16 72	....	24 80	1 86	20 04	5 53	.....	18 50	158 25	385 25
Apr. 14,1905	Third, from 27 ft. 4 in. s of n of Baltimore to 18 ft. of n of Milwaukee	300	12 in.	279 42	14 90	33 44	....	90 30	5 25	90 89	8 84	.....	15 00	218 12	756 16
Apr. 21,1905	Thurman, from 134 ft. n of n of Palmer to 286 ft. n of same...........	152	6 in.	58 05	....	8 36	....	11 50	51	....	4 01	.....	7 60	40 00	130 08
June 6, 1905	Thirtieth, from 252 ft. n of n of Horatio to 157 ft. n of n of same......	96	6 in.	36 66	....	4 75	....	....	18	....	3 75	.....	4 80	32 93	83 07
June26 1905	Thirtieth, from 28 ft. of s of Jackson to old pipe n of Visger........	398	6 in.	151 99	....	14 25	....	....	1 82	....	6 89	.....	19 90	104 50	298 85
July 9, 1904	Weyler, from 46 ft. w of e of McClellan to 315 ft. e of same.......	361	6 in.	152 22	3 04	14 62	....	26 00	6 17	21 13	7 01	.....	18 05	73 00	321 24
July 22,1904	Waterloo, from 27 ft. w of e of Van Dyke to 34 ft. e of w of Parker	300	6 in.	126 51	9 91	14 62	....	14 50	2 24	21 63	4 39	.....	15 00	54 00	262 80
Oct. 31, 1904	Warren, from w line of Scotten to 131 ft. w of w of Lovett...........	554	6 in.	234 75	13 91	20 79	....	24 80	2 41	19 76	6 09	....	27 70	220 77	570 98
Nov.30, 1904	Woodward Terrace, from 25 ft. w of e of John R to 31 ft. w of w of same	66	4 in.	16 70	7 20	5 72	....	22 80	3 04	43 16	3 26	15 99	......	77 68	195 55
Nov. 30,1904	Warren, from 37 ft w of e of Humboldt to 35 ft. n of of Grand River	984	10 in.	647 60	12 46	....	....	52 00	56	part of Subway.			.....	....	712 62
Dec.16, 190	Warren, from 100 ft west of Collinsw	115	6 in.	42 04	84	4 18	....	......	1 06	....	1 14	....	5 75	43 83	98 84
May 25, 1905	Wellington, from e line of Russell to 200 ft. e of Greeley................	476	6 in.	181 01	5 58	16 63	....	24 90	18 96	4 05	8 21	.....	23 80	107 40	390 54
June 19,1905	Wesson, from 390 ft. s of s of Devereux to 2 ft. n of s of same	392 5	6 in. 4 in.	150 96	6 02	14 25	....	11 50	3 81	....	8 96	....	19 60	142 75	357 85
June 6, 1905	Weitzel Court, from 14 ft. e of w of Ellery to 24 ft. w of e of Mt. Elliott	808	6 in.	307 79	2 30	24 93	....	26 80	3 45	38 24	8 08	.....	40 40	212 72	694 71

SUMMARY OF THE AMOUNT OF PIPE LAID IN DETROIT AND VILLAGES OUTSIDE, FROM JULY 1st, 1904, TO JULY 1st, 1905.

LOCATION OF PIPE.	Feet.	Size.	COST OF CONSTRUCTION										
			Pipe.	Specials.	Lead.	Gates. Cost.	Sundries	Gatewell	Hauling.	Re-paving	Sup. & Eng.	Labor.	Total Cost.
City of Detroit	53 337.6 32,446.2 3,695 4,113 1,819 8,972	3 in. 4 in. 6 in. 8 in. 10 in. 12 in. 42 in.	$ 87,538 37	$3,075 48	$5,981 44	$6,713 10	$4,013 44	$4,5 6 55	$4,484 09	$338 73	$2,540 34	$84,618 54	$206,860 08
Total	51,435.8												
Village of Fairview	653 3,448 12,015	4 in. 6 in. 8 in.	7,085 84	1,740 34	809 84	329 71	180 94	329 51	324 01	....	795 15	6,403 29	17,948 63
Total	16,116												
Village of Delray	1,379	6 in.	581 50	22 41	53 13	50 80	14 29	38 76	32 33	....	68 95	314 97	1,177 14
Total	1,379												
Village of Woodmere	215 1,258	4 in. 6 in.	618 42	22 96	59 01	49 80	7 37	59 96	28 18	....	73 65	434 05	1,254 40
Total	1,473												
Village of Highland Park	3,742	6 in.	1,425 47	44 72	139 76	92 48	20 69	96 07	60 25	....	187 10	1,221 62	3,288 16
Total	3,742												
Village of Hamtramck	1,330 3,280	4 in. 6 in.	1,669 54	60 30	193 80	95 50	30 00	82 87	71 79	....	22 95	1,248 56	3,681 91
Total	4,610												
Fair Grounds	9,391 6 in.	8 in.	4,960 99	21 48	460 75	& meter 358 50	28 69	253 93	177 75	....	460 68	2,777 02	9,508 69
Total	9,391 6 in.												
St. Clair Heights	806	6 in.	337 93	....	26 15	14 74	1 33	19 33	28 50	....	40 50	179 22	647 28
Total	806												
River Rouge	11,782	6 in.	4,309 79	936 79 & Hyd's	497 42	393 40	63 43	408 88	296 50	....	589 10	3,149 07	10,645 28
Total	11,782												

Total ....100,785 ft. 9 in. or $19\frac{415}{5280}$ miles. Total cost, $255,011 57

Respectfully submitted,

JOHN DELANY.

SUPPLEMENT.

BOARD OF MANAGEMENT OF DETROIT WATER WORKS.

Board of Trustees appointed by Common Council, February 24th, 1852; organized March 1st, 1852.

Shubael Conant, Chairman.
Edmund A. Brush.
Henry Ledyard.
Wm. R. Noyes.
Jas. A. Van Dyke.

1853.

On the 16th of May, 1853, the Board of Water Commissioners of the City of Detroit was organized under an act previously approved by the Common Council and passed by the Legislature, February 14th, 1853. The term of service was determined by lot, as follows:

Jas. A. Van Dyke,	for 3 years.
Edmund A. Brush,	for 4 years.
Henry Ledyard,	for 5 years.
Shubael Conant,	for 6 years.
Wm. R. Noyes,	for 7 years.

Shubael Conant was elected President, who, finding the duties too arduous, resigned July 30th, and Edmund A. Brush was elected.

1854.

Edmund A. Brush, President.
Jas. A. Van Dyke.
Shubael Conant.
Wm. R. Noyes.
Henry Ledyard.

1855.

Edmund A. Brush, President.
Henry Ledyard.
Shubael Conant.
William R. Noyes.
James A. Van Dyke, died May 8th.
A. D. Fraser, appointed to fill vacancy.

1856.

Edmund A. Brush, President.
Shubael Conant.
Wm. R. Noyes.
Alexander D. Fraser, re-appointed May 1st, for 5 years
Henry Ledyard.

1857.

Edmund A. Brush, President, re-appointed May 1st, for 5 years.
Henry Ledyard.
Alexander D. Fraser.
William R. Noyes.
Shubael Conant.

1858.

Edmund A. Brush, President.
Shubael Conant.
Alexander D. Fraser.
Henry Ledyard, re-appointed May 1st, for 5 years.
Wm. R. Noyes.

1859.

Edmund A. Brush, President.
Alexander D. Fraser.
Wm. R. Noyes.
Shubael Conant, term expired May 1st, and
Julius D. Morton, appointed for 5 years.
Henry Ledyard, vacated by moval from city, and
John V. Ruehle, appointed May 1st to fill vacancy.

1860.

Edmund A. Brush, President.
Alexander D. Fraser.
ulius D. Morton.
William R. Noyes, re-appointed May 1st, for 5 years.
John V. Ruehle.

1861.

Edmund A. Brush, President.

Alexander D. Fraser, re-appointed May 1st for 5 years.

Jno. V. Ruehle, resigned Sept. 16th, and

Chauncey Hurlbut appointed to fill vacancy.

1862.

Edmund A. Brush, President, re-appointed May 1st, for 5 years.

Wm. R. Noyes.

Julius D. Morton.

Chauncey Hurlbut.

Alexander D. Frazer.

1863.

Edmund A. Brush, President.

Alexander D. Frazer.

Wm. R. Noyes.

Julius D. Morton.

Chauncey Hurlbut, term expired May 1st, and

Stanley G. Wight, appointed for 5 years.

1864.

Edmund A. Brush, President.

Alexander D. Frazer.

Wm. R. Noyes.

Julius D. Morton, term expired May 1st.

Stanley G. Wight.

1865.

Edmund A. Brush, President.

Wm. R. Noyes, resigned Jan. 10, and Jacob S. Farrand appointed to fill vacancy, Term expired May 1st. Re-appointed for 5 years.

Alexander D. Frazer.

Stanley G. Wight.

Julius D. Morton, re-appointed for 5 years from May 1st, 1864. Died Feb. 1865, and

Jno. Owen appointed to fill vacancy.

1866.

Edmund A. Brush, President.

Alexander D. Fraser, re-appointed May 1, for 5 years.

Stanley G. Wight.

Jacob S. Farrand.

Jno. Owen.

1867.

Edmund A. Brush, President, re-appointed May 1, for 5 years.
Alexander D. Fraser.
Jacob S. Farrand.
Jno. Owen.
Stanley G. Wight.

1868.

*Edmund A. Brush, President.
Stanley G. Wight, term expired May 1, and
Chauncey Hurlbut appointed for 5 years.
Jacob S. Farrand.
John Owen.
Caleb Van Husan.

*Edmund A. Brush resigned January 28, and Caleb Van Husan appointed to fill vacancy, and Alexander D. Fraser elected President.

1869.

Alexander D. Fraser, President.
John Owen, re-appointed May 1, for 5 years.
Jacob S. Farrand.
Caleb Van Husan.
Chauncey Hurlbut.

1870.

Alex. D. Fraser, President.
Jacob S. Farrand, re-appointed May 1, for 5 years.
Jno. Owen.
Caleb Van Husan.
Chauncey Hurlbut.

1871.

*Alex. D. Fraser, President.
Jacob S. Farrand.
Caleb Van Husan.
Chauncey Hurlbut.
John Owen.

*Term expired May 1, and Samuel F. Hodge appointed for 5 years. Jacob S. Farrand elected President.

1872.

Jacob S. Farrand, President.
Jno. Owen.
*Caleb Van Husan.
Samuel F. Hodge.
Chauncey Hurlbut.

*Term expired May 1st, and Elija Smith appointed for 5 years.

1873.

*Chauncey Hurlbut, President. Jacob S. Farrand.
Jno. Owen. Samuel F. Hodge.
Elija Smith.

*Term expired and re-appointed. Elected President, May, 1872.

1874.

Chauncey Hurlbut, President. Jacob S. Farrand.
*Jno. Owen. Samuel F. Hodge.
Elija Smith.

*Term expired and re-appointed.

1875.

Chauncey Hurlbut, President. *Jacob S. Farrand.
Jno. Owen. Samuel F. Hodge.
Elija Smith.

*Term expired and re-appointed.

1876.

Chauncey Hurlbut, President. Jacob S. Farrand.
Jno. Owen. *Samuel F. Hodge.
Elija Smith.

*Term expired and re-appointed.

1877.

Chauncey Hurlbut, President. Jacob S. Farrand.
Jno. Owen. Samuel F. Hodge.
*Michael Martz.

*Elija Smith's term expired and Michael Martz appointed to fill vacancy.

1878.

*Chauncey Hurlbut, President. Jacob S. Farrand.
Jno. Owen. Samuel F. Hodge.
Michael Martz.

*Term expired and re-appointed.

1879.

Chauncey Hurlbut, President. Jacob S. Farrand.
Michael Martz. *Jas. Beatty.
*Jno. Pridgeon.

*Jno. Owen's term expired and John Pridgeon appointed to fill vacancy. Samuel F. Hodge resigned and Jas. Beatty appointed to fill vacancy.

1880.

Chauncey Hurlbut, President. *Jacob S. Farrand.
Michael Martz. Jas. Beatty.
Jno. Pridgeon.

*Term expired and re-appointed.

1881.

Chauncey Hurlbut, President. Jacob S. Farrand.
Michael Martz. *Jas. Beatty.
Jno. Pridgeon.

*Term expired and re-appointed.

1882.

Chauncey Hurlbut, President. Jacob S. Farrand.
*Michael Martz. Jas. Beatty.
Jno. Pridgeon.

*Term expired and re-appointed.

1883.

*Chauncey Hurlbut, President. Jacob S. Farrand.
Michael Martz. Jas. Beatty.
Jno. Pridgeon.

*Term expired and re-appointed.

1884.

Chauncey Hurlbut, President. Jacob S. Farrand.
Michael Martz. Jas. Beatty.
*Jno. Pridgeon.

*Term expired, and Marshall H. Godfrey appointed

1885.

*Jacob S. Farrand, President. Michael Martz.
Marshall H. Godfrey. *Edwin F. Conely.
*Samuel G. Caskey.

*Jas. Beatty died and Edwin F. Conely appointed to fill vacancy.
*Chauncey Hurlbut died and Samuel G. Caskey appointed to fill vacancy.
*Jacob S. Farrand's term expired and re-appointed.

1886.

Jacob S. Farrand, President. Michael Martz.
Marshall H. Godfrey. *Jno. Pridgeon.
Samuel G. Caskey.

*Edwin F. Conely's term expired and Jno. Pridgeon appointed to fill vacancy.

1887.

Jacob S. Farrand, President. Jno. Pridgeon.
Marshall H. Godfrey. Samuel G. Caskey.
*Joseph Nagel.

*Michael Martz term expired and Joseph Nagel appointed to fill vacancy.

1888.

Jacob S. Farrand, President. Jno. Pridgeon.
Marshall H. Godfrey. *Samuel G. Caskey.
Joseph Nagel.

*Term expired and re-appointed.

1889.

Jacob S. Farrand, President. Jno. Pridgeon.
Samuel G. Caskey. Jos. Nagel.
*August Goebel.

*Marshall H. Godfrey resigned January 1, 1889. August Goebel appointed to fill vancancy. Term expired May 1st, and re-appointed.

1890.

Jno. Pridgeon, President.
August Goebel.
Joseph Nagel.
*Henry M. Duffield.
Samuel G. Caskey.

*Jacob S. Farrand's term expired, and Col. Duffield was appointed to fill vacancy July 9th, 1890; John Pridgeon resigned as President of the Board, on account of ill-health, and Henry M. Duffield was elected to fill vacancy.

1891.

Henry M. Duffield, President.
*Jno. Pridgeon.
August Goebel.
Samuel G. Caskey.
Joseph L. Hudson.

*John Pridgeon's term expired May 1st, and Frank E. Kirby was appointed for a term of 5 years.

1892.

Samuel G. Caskey, President.
Henry M. Duffield.
August Goebel.
Joseph L. Hudson.
Frank E. Kirby.

1893.

August Goebel, President.
Samuel G. Caskey.
Frank E. Kirby.
Henry M. Duffield.
Joseph L. Hudson.

1894.

Henry M. Duffield, President.
Frank E. Kirby.
Albert L. Stephens.
De Witt H. Moreland.
Edward W. Pendleton.

A. L. Stephens appointed to succeed J. L. Hudson.
D. W. H. Moreland appointed to succeed S. G. Caskey.
Clarence A. Black appointed to succeed August Goebel.
C. A. Black resigned and E. W. Pendleton appointed to succeed him from Dec, 1.

1895.

Frank E. Kirby, President.
Albert L. Stephens.
DeWitt H. Moreland.
Edward W. Pendleton.
Darius D. Thorp.

1896.

Albert L. Stephens, President.
Edward W. Pendleton.
John P. Huckestein.
Darius D. Thorp.
John W. McGrath.

D. W. H. Moreland resigned to accept Commissionership on Board of Public Works, and J. P. Huckestein was appointed to fill vacancy.

Frank E. Kirby's term expired and J. W. McGrath was appointed to succeed him

1897.

Edward W. Pendleton, President.
Darius D. Thorp.
James W. Millen.
John W. McGrath.
August Goebel.

August Goebel, appointed to succeed A. L. Stephens. Resigned January 1, 1898 and Joseph J. Noeker was appointed to fill vacancy.

John P. Huckestein resigned and James W. Millen was appointed to fill vacancy

1898.

Edward W. Pendleton, President.
Joseph J. Noeker.
John W. McGrath.
Darius D. Thorp.
James Meathe.

1899.

Darius D. Thorp, President.
John W. McGrath.
Joseph J. Noeker.
*James Meathe.
Edward W. Pendleton.

*James Meathe died September 21st, 1899, and Benjamin Guiney was appointed to fill vacancy.

1900.

John W. McGrath, President.
Joseph J. Noeker.
*Benjamin Guiney.
Edward W. Pendleton.
Darius D. Thorp.

Benjamin Guiney resigned, and John Zynda was appointed to fill vacancy.

1901.

Joseph J. Noeker, President.
John Zynda.
Edward W. Pendleton.
Darius D. Thorp.
Joseph J. Crowley.

1902.

John Zynda, President.
Darius D. Thorp.
Edward W. Pendleton.
Joseph J. Crowley.
John Schroeder.

1903.

Edward W. Pendleton, President.
Darius D. Thorp.
Joseph J. Crowley.
John Schroeder.
John Zynda.

1904.

Darius D. Thorp, President.
Joseph J. Crowley.
John Schroeder.
John Zynda.
Edward W. Pendleton.

1905.

Joseph J. Crowley, President.
John Zynda.
John Schroeder
Edward W. Pendleton.
John F. Dodge.

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FIFTY-FOURTH
ANNUAL REPORT
OF THE
BOARD OF WATER COMMISSIONERS

WATER WORKS 1874.

TO THE

COMMON COUNCIL OF THE CITY OF DETROIT

FOR YEAR
ENDING JUNE 30TH
1906.

FIFTY-FOURTH ANNUAL REPORT

OF THE

Detroit BOARD OF WATER COMMISSIONERS

OF THE CITY OF DETROIT

TO THE

COMMON COUNCIL OF THE CITY OF DETROIT

TOGETHER WITH THE

REPORTS OF THE OFFICERS OF THE BOARD

FOR YEAR

ENDING JUNE 30TH, 1906

DETROIT FREE PRESS PRINTING COMPANY,
1906.

CONTENTS.

PAGE.
Report of the Commissioners.. 7
Financial Report of the Secretary..10
Report of the General Manager..27
Report of the Civil Engineer..34
Report of Superintendent of Meters and Inspection......................47
Report of the Chief Engineer at Pumping Works...........................55
Report of the Superintendent of Construction...........................60
Supplement.. ...81

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BOARD OF WATER COMMISSIONERS

OF THE

CITY OF DETROIT.

MEMBERS:

JOHN SCHROEDER, 1907. EDWARD W. PENDLETON, 1909.
JOHN ZYNDA, 1908. JOHN F. DODGE, 1910
FREDERICK J. CLIPPERT, 1911.

COMMITTEES:

Ways and Means	Commissioners PENDLETON, ZYNDA.
Extension and Construction,	Commissioners DODGE, CLIPPERT.
Pumping Works	Commissioners CLIPPERT, PENDLETON.
Supplies	Commissioners ZYNDA, DODGE.

The President is ex-officio member of each committee.

OFFICERS:

President	JOHN SCHROEDER.
Vice-President	JOHN ZYNDA.
General Manager	H. S. STARKEY.
Secretary	BENJ. F. GUINEY.
Superintendent of Construction	JOHN DELANY.
Supt. of Meters and Inspection	THOMAS R. PUTNAM.
Civil Engineer	CLARENCE W. HUBBELL.
Chief Engineer at Pumping Works	URIAH GOULD.
Bookkeeper	W. W. WILCOX.
Receiving Clerk	GEORGE E. KUNZE.
Cashiers	D. C. GROBBEL. CHARLES W. KEENA.
Meter Clerks	W. W. COONEY. CHAS. F. GILMER.
Permit Clerk	GEO. BARRIE.
Collectors	FRANK PETZ. ALBERT L. STADLER. ANTHONY VOGEL. ANTHONY J. LOOK. WM. COSGROVE. JOHN J. ROBINSON. M. A. DETTLING. THOMAS J. CLANCY. JOHN C. BECKER. GEO. P. MOOG.

THE BOARD OF WATER COMMISSIONERS

OF THE

CITY OF DETROIT.

RATES JULY 1, 1906.

METER RATES.

Payable Quarterly.

	QUARTERLY
First 30,000 gals	$1 75
All in excess of 30,000 gals	2¼ cts. per M
Minimum Rate	1 75

ASSESSMENT RATES.

	PER ANNUM
For Family, household purposes	$2 60
Additional Families to first, in same house supplied through same faucet, each family	1 40
Green Houses.—Special rates.	
Private Stable, for each horse	1 20
Livery Stables, " " "	1 20
Dray and Team Horses, each	60
Cows, each	60
Stores and Offices, from	$1 00 to 12 00
Bakeries, average daily use for each barrel of flour	2 00
Groceries and Provision Stores, from	$3 00 to 50 00
Saloons, from	6 00 to 50 00
Bar, with faucet, from	8 00 to 50 00
Fish Houses, from	6 00 to 50 00
Beer Pump	2 00
Barber Shops, each chair	2 00
Slaughter Houses.—Special rates.	
Hotels and Taverns, in addition to family rate, each room	60
Boarding Schools, from	$4 00 to 50 00
Printing Offices.—Special rates.	
Butcher Stalls, each not less than	3 00
Workshops, for 10 persons or under	3 00
" for each additional 10 persons	1 00
Boarding Houses, in addition to family rate, each boarder or roomer,	40
Estimated quantities of water each 1,000 gallons	07
Building Purposes, each 1 M brick	03
" " " 100 yards plastering	05
" " " perch stone	01
" " minimum	50

FIXTURES.

Bath Tub, for families, 1st tub	$1 00
" " each additional tub	60
" " public, each tub	4 00
Automatic Water Closets, for family. 1st closet	1 60
" " " each additional	60
" " " for hotels, stores, factories, etc., for 10 persons	2 00
" " " each additional person	20
Rod Water Closets, not less than	6 00
Urinals, not less than	2 00
Wash Hand Basins, for family, each	48
" " " for other purposes, each person	15
Hose Bibb or Connection, premises 30 feet front or less	60
" " " " 30 feet to 60 feet	80
" " " " 60 feet to 100 feet	1 60
Special Rates for larger grounds.	
Fountains	$5 00 to 20 00
Street Sprinklers, each wagon	50 00

Where there is a waste of water an increase of rates will be made.

ANNUAL REPORT
OF THE
BOARD OF WATER COMMISSIONERS
OF THE
CITY OF DETROIT.

To the Honorable the Common Council of the City of Detroit:

GENTLEMEN—The Board of Water Commissioners of the City of Detroit respectfully submits herewith its annual report for the fiscal year ending June 30th, 1906.

In compliance with long established custom, detailed reports of the executive officers are presented, to which your attention is especially invited.

The subdivision of work into various departments, instituted years ago, has constituted a valuable aid in the matter of fixing responsibility and of thorough and methodical supervision, and the advantages of this method have become more evident as the volume of work has increased. During the past year, two departments have been consolidated, the Storage Grounds and the Iron Pipe, saving the expense of one Superintendent and three clerks.

Since the end of the fiscal year, but before the publication of this report, an additional economy has been effected, without loss of efficiency, by combining in one man the work of two foremen on the Pumping Station Grounds.

As now arranged, the administration is divided into the following departments: Office, including the collection of water rates and general financial affairs; Civil Engineering; Mechanical Engineering; Iron Pipe; Meter and Inspection and Pumping Station Grounds.

The efficiency of administration is also increased by the appointment of four standing committees, each consisting of two commissioners. Each committee, while having supervision of separate departments, acts only under special instruction of the entire Board. By this plan, no commissioner is relieved from responsibility for the work in any department.

We again invite the careful inspection of your honorable body to any and all departments of this Board. The books are always open. During the past year all financial transactions have been carefully examined by the city accountant.

The use of water by the city through the newly constructed tunnel and crib was commenced on the 18th day of December, 1905. Previous annual reports contain full information in regard to this important work, the necessity and success of which require no vindication. Detroit is now provided with two complete and independent supply systems, always ready for use as occasion may demand.

It is hoped that the matter of protection from pollution of water from sewerage, east of the city limits, will be definitely and speedily settled. Relying upon the statute of 1853, creating the Board of Water Commissioners of the City of Detroit, the present pumping station was established and the entire system has been developed. There is no problem confronting the City of Detroit today equal in importance to the preservation of a pure and wholesome water supply.

In common with other municipal departments, the recent annexation of the Eighteenth Ward has largely increased our responsibilities and demands. Every effort is making to meet these requirements.

With a view of being forearmed, a strip of land has been recently purchased, adjoining the present pumping station grounds, having a frontage of 506.06 feet on Jefferson avenue, extending with equal width to a depth of 884.88 feet. This purchase will allow the construction of a new engine house with gates and mains, affording distribution, without interfering with the complicated net-work of mains now monopolizing the premises. The extra expense of the necessary re-arrangement of the entire underground system, demanded by an additional engine house upon the present grounds, would equal the entire cost of purchase of the new addition.

The total receipts during the fiscal year aggregate the sum of $751,604.80, of which sum outlying villages have paid $59,027.61. The total expenditures amount to the sum of $783,567.89, consisting of the following items: Bonds redeemed, $189,000.00; Construction, $370,937.68; Operation and maintenance, $152,076.93; Hurlbut Fund $4,118.43; Interest, $46,278.00; and Real Estate, $21,156.85.

All of which is respectfully submitted.

JOHN SCHROEDER,
JOHN ZYNDA,
EDWARD W. PENDLETON,
JOHN F. DODGE,
FREDERICK J. CLIPPERT.

Detroit, Mich., July 1st, 1906.

REPORT OF THE SECRETARY.

Detroit, Mich., July 1st, 1906.

To the Board of Water Commissioners of the City of Detroit, Michigan:

GENTLEMEN—I have the honor to submit my report as Secretary for the year ending June 30, 1906.

Total Receipts, $751,604.80. Of this amount $59,027.61 was paid in by villages and individuals outside of the city for water main extensions.

The expenditures total $783,567.89, of which the following items might be considered as extraordinary: Bonds redeemed, $189,000.00. Final payment on new engines, $79,390.83. Final payment on tunnel, $19,487.26. Final payment on intake crib, $31,482.60. Payment on land contract for property purchased east of Pumping Station $20,000.00. A detailed statement of the receipts and disbursements is herewith submitted.

Receipts.

Water rates assessed	$314,830 50	
Water rates metered	186,520 94	$501,351 44
Percentage		6,134 25
Shutting off and letting on		271 00
Plumbers' licenses		496 25
Service cocks, permits		10,513 75
Service cocks, material and labor		376 90
City of Detroit, general tax levy		75,000 00
Real estate revenue and expense, rentals		2,043 49
Meter, material and labor		543 61
Meter repairs and expenses, material and labor		14 00
Iron pipe, material and labor		9,861 55
Iron pipe bonus		2,459 71
Village of Fairview, estimates for laying pipe		19,978 00

Village of St. Clair Heights, estimate for laying pipe		18,297 68
Village of Highland Park, estimate for laying pipe		10,233 00
Village of Woodmere, estimate for laying pipe		4,743 00
Village of Delray, estimate for laying pipe		2,425 00
Michigan State Agricultural Society, estimate for laying pipe		2,326 93
Frank S. Girardin, in Village Hamtramck estimate for laying pipe		1,024 00
Pumping works, material		1,048 25
Pumping water, material		29 75
Engineering, survey, Village of St. Clair Heights		225 00
Service extensions		34 49
Interest Account, interest on Gen. Fund..		2,143 28
Interest Account, Interest on Sinking Fund		939 09
Interest Account, interest on Hurlbut Fund	16 38	
Hurlbut Fund, from trustees	4,000 00	4,016 38
Loan Account		75,000 00
Horse and wagon, sale of horse		65 00
Office, material		10 00
		$751,604 80

Disbursements.

OPERATION AND MAINTENANCE.

Office Account—

General manager, secretary and clerks	$27,399 62
Watchmen and janitor	2,045 00
General work and carpenter	1,537 62
Scrubbing	117 00
Books, printing and stationery	1,309 91
Printing annual reports	214 00
Telephone rental	259 09
Advertising and subscription	173 89
Stamped envelopes and postage	357 34
Towel supply	78 00
Street car tickets	10 00
Rubber stamps	3 20
Disinfectant	14 00
Ice	73 80
Coal	399 22

Gas	7 11	
Bond premiums	105 00	
Horse care	180 25	
Horse shoeing	29 00	
Miscellaneous	173 36	
		$ 34,486 41

Service Connections and Leaks Account—

Superintendent, inspection and labor	17,972 56	
Service cocks, sleeves and valves	2,846 22	
Tools and repairs	181 62	
Printing and stationery	172 00	
Telephone rental	38 50	
Car tickets	235 00	
Oil	3 60	
Freight and express	15 61	
Inspection and repaving	8 58	
Lead pipe and fittings	132 68	
Coal	37 50	
Miscellaneous	1 42	
		$21,645 29

Pumping Water Account—

Engineers, firemen, coal passers	36,800 15	
Coal	20,925 62	
Unloading coal	2,388 74	
Boiler, engine supplies and repairs	1,032 70	
Engine oil and grease	534 13	
Kerosene and gasoline	12 00	
Waste, packing and rags	513 79	
Boiler inspection and insurance	258 00	
Electric light fixtures and repairs	38 37	
Hose and couplings	37 48	
Tools and repairs	70 12	
Paint, oil and glass	29 35	
Printing and stationery	41 80	
Telephone rental	54 00	
Ice	60 30	
Towel supply	63 93	
Horse shoeing and harness	22 25	
Horse feed and bedding	57 62	
Freight and express	5 91	
Waste machine	150 00	
Miscellaneous	175 03	
		$63,271 29

Repairing Leaks Account—

Superintendent, clerks, watchmen and laborers	$ 3,193 87	
Inspection and repaving	409 01	
Telephone rental	28 00	
Tools and repairs	12 00	
Car tickets	20 00	
Rubber boots and repairing	44 15	
Bicycle repairs	7 10	
Printing and stationery	9 50	
Wood plugs	18 00	
Pump and repairs	60 00	
Coal	37 50	
Miscellaneous	21 90	
		$ 3,861 03

Meter repairs and expenses—

Superintendent and labor	$ 1,342 93	
Meter fittings	313 50	
Printing and stationery	6 75	
Express	98	
		$ 1,664 16

Percentage Account—

Superintendent and labor	$ 7,020 83	
		$ 7,020 83

Inspection Account—

Superintendent, inspectors and clerks	$ 7,937 47	
Car tickets	170 00	
Electric lamps	45 65	
Printing and stationery	6 65	
		$ 8,159 77

Wagon and Harness Account—

Harness and repairs	$ 429 33	
Wagon repairs	129 85	
Barn tools	52 93	
Paint	5 52	
		$ 617 63

Office Furniture and Fixtures Account—

Furniture and repairs	$ 158 25	
Electric fixtures	17 38	
Still alarm	118 50	
Boiler inspection	1 50	
		$ 295 63

Real Estate Revenue and Expense—		
Insurance premium	$ 134 34	
Papering and painting houses, storage yard	131 50	
Lumber	60 26	
Paint, oil and glass	94 52	
Nails, screws, etc.	36 98	
Roof repairs, main office	65 13	
		$ 522 73
Horse Expense Account—Service Connections—		
Feed and bedding	$ 647 29	
Shoeing	124 74	
Veterinary services and drugs	22 14	
		$ 794 17
Horse Expense Account, Repairing Leaks—		
Feed and bedding	$ 647 32	
Shoeing	132 22	
Horse care	165 00	
Veterinary services and drugs	29 41	
		$ 973 95
Pumping Works, Grounds—		
Superintendent, and labor	$ 7,552 14	
Drinking fountains	226 26	
Elm trees and seed	520 51	
Tools and fittings	135 96	
Roof repairs	57 67	
Paint, oil and glass	39 00	
Lumber	15 29	
Printing and stationery	19 60	
Horse shoeing	11 25	
Ice	29 75	
Bronze tablet	95 00	
Phone	11 50	
Miscellaneous	50 11	
		$ 8,764 04
Iron Pipe, Construction—		
Superintendent and clerks	$11,541 05	
Foreman	2,699 07	
Watchmen, teamsters, plumbers, bricklayers	14,284 34	
Laborers	69,740 86	
Iron pipe	39,997 95	
Special castings	6,580 72	
Gates, valves and hydrants	6,025 64	
Pig lead	5,327 48	

Lead pipe and solder	50 86	
Brick, sand, cement and stone	3,660 28	
Lumber	232 00	
Coal	547 81	
Oil and gasoline	92 65	
Tools	261 95	
Repairing tools	47 86	
Nails, fittings, iron, lanterns, globes	119 56	
Channel iron and beams	30 75	
Cartage	718 05	
Hose and couplings	227 64	
Waste, packing and rope	230 63	
Telephone rental	376 26	
Paint and oil	10 76	
Car tickets and toll	248 76	
Books, printing and stationery	200 55	
Rubber boots and repairing	103 26	
Pumps and repairing	115 40	
Inspection and repaving	4,941 09	
Protecting railroad tracks, laying pipe	554 52	
Refund, pipe estimate—Village of River Rouge	690 72	
Refund, pipe estimate, Village of Delray	687 56	
Refund, pipe estimate, Village of Woodmere	221 90	
Refund, pipe estimate, Village of Highland Park	113 58	
Refund, pipe estimate, Village of Hamtramck	103 04	
Refund, pipe estimate, F. S. Jaridin and N. B. Sackett	98 19	
Electrolysis, consulting engineer	821 18	
Doctor's services and damages	156 00	
Miscellaneous	177 11	
		$172,037 03

Horse Expense Account, Iron Pipe—

Feed and bedding	$ 1,316 18	
Shoeing	252 21	
Purchase of horses	1,070 00	
Pasture	12 00	
Veterinary and drugs	36 27	
		$ 2,686 66

Meter—

Superintendent, foremen and labor	$ 5,043 62	

Meters	6,742 43	
Meter specials and fittings	149 23	
Telephone rental	54 00	
Printing and stationery	8 60	
Lumber	74 73	
Packing, rags and belting	15 68	
Tools and repairing	7 72	
Oil and gasoline	3 00	
Paint and oil	95	
Shoeing	89 00	
Horse care	135 00	
Bicycle and repairs	88 63	
Harness and repairs	10 50	
Miscellaneous	5 96	
		$12,429 05

Engineering—

Civil engineer and assistants	$13,869 53	
Paper and tracing cloth	166 13	
Stationery, books and maps	305 10	
Street car tickets	130 00	
Phone rental	54 00	
Instruments, tools and fittings	53 72	
Postage stamps	5 00	
Lumber	3 20	
Subscription	7 60	
Rubber boots	5 32	
Express charges	1 83	
Electric power	14 99	
Miscellaneous	14 30	
		$14,630 72

Pumping Works—

Superintendent, foremen and labor	$ 5,413 09
Crib attendants	242 50
Allis Chalmers, engine contract	79,390 83
Chimney contract, Blay & Co.	8,086 75
Engine expert, inspecting engines, J. B. Calder	1,090 00
Architects, Field, Hinchman & Smith	975 63
Water and steam piping, P. Wenzel	5,000 00
Gates	5,992 79
Iron beams and tools	163,67
Installing telephone service with Fire Dept.	86 95
Rope	17 64
Stone, sand and cement	747 60

Freight charges	3 83	
Coal cars	200 00	
Lumber	86 32	
Oil and gasoline	18 80	
Advertising	174 54	
Boiler contract, Wickes Bros.	4,343 00	
Paint	16 25	
Boat rental	41 80	
Miscellaneous	24 70	
		$112,116 69
Village of Fairview—		
Superintendent, foreman and labor	$ 5,241 82	
Hydrants	650 00	
		$ 5,891 82
Tunnel and Crib—		
C. H. Fath & Son Construction Co., contract	19,487 26	
W. J. Gawne Co., contract	31,482 60	
Dr. F. Duffield, services	25 00	
Use of diver's suit	10 00	
Rent of launch	3 00	
Locks, etc.	34 35	
Miscellaneous	103 50	
		$ 51,145 71

INDEPENDENT.

Hurlbut Fund—		
Library assistants, superintendent and laborers	$ 3,484 92	
Janitor service	27 00	
Calsomining and varnishing	151 50	
Repairing roof	65 86	
Magazines and papers	33 50	
Library furniture and fixtures	47 85	
Lumber	55 53	
Hose and couplings	24 00	
Paint, oil and glass	49 51	
Flower pots and frames	47 72	
Towel supply	4 00	
Electric light fixtures	58 21	
Iron and tools	26 34	
Seed	22 11	
Car tickets	2 00	
Miscellaneous	18 38	
		$ 4,118 43

Bonded Indebtedness—		
Bonds redeemed	$189,000 00	
		$189,000 00
Interest—		
Coupons	46,278 00	
		$ 46,278 00
Real Estate—		
New pumping works addition	20,000 00	
Interest	1,153 35	
Recording deeds	3 50	
		$ 21,156 85

RECAPITULATION OF EXPENDITURES FOR OPERATION, MAINTENANCE, CONSTRUCTION AND INDEPENDENT.

For Operation and Maintenance—		
Office	$34,486 41	
Service connections	21,645 29	
Pumping water	63,271 29	
Repairing leaks	3,861 03	
Meter repairs and expenses	1,664 16	
Percentage	7,020 83	
Inspection	8,159 77	
Wagon and harness	617 63	
Office furniture and fixtures	295 63	
Real estate, revenue and expense	522 73	
Horse expense (service connections)	794 17	
Horse expense (repairing leaks)	973 95	
Pumping works, grounds only	8,764 04	
For Construction—		
		$152,076 93
Iron pipe	$172,037 03	
Iron pipe, horse expense	2,686 66	
Meter	12,429 05	
Engineering	14,630 72	
Pumping works	112,116 69	
Village of Fairview	5,891 82	
Tunnel and crib	51,145 71	
		$370,937 68
Hurlbut Fund	4,118 43	
Bonded indebtedness	189,000 00	
Interest	46,278 00	
		$239,396 43
Real estate		$ 21,156 85
Total		$783,567 89

GENERAL RECAPITULATION OF EXPENDITURES.

Total operation and maintenance	$152,076 93	
Total construction	370,937 68	
Bonds paid from Sinking Fund	189,000 00	
Interest paid from Sinking Fund	46,278 00	
Hurlbut Fund paid from Hurlbut Fund	4,118 43	
Real estate	21,156 85	
Total expenditures		$783,567 89
Total operation	$152,076 93	
Total construction	370,937 68	
Total independent	260,553 28	
		$783,567 89

The total receipts of the Receiving Clerk from July 1st, 1905, to July 1st, 1906, were as follows:

1905.		
July	$134,833 60	
August	72,014 33	
September	21,076 09	
October	102,746 83	
November	22,478 24	
December	20,575 09	
1906.		
January	108,690 68	
February	18,294 71	
March	17,801 86	
April	95,411 88	
May	13,594 68	
June	120,359 44	
Total receipts	$751,604 80	
Cash on hand June 30, 1905	2,960 05	
		$754,564 85

With bank deposits as follows:

1905.	
July	$130,300 81
August	78,213 67
September	19,591 04
October	102,746 83
November	27,387 23
December	19,247 79
1906.	
January	105,077 54
February	23,082 02

March	16,579 34	
April	90,103 82	
May	20,011 72	
June	117,857 25	
Total deposits	$750,198 56	
Cash on hand June 30, 1906	4,366 29	
		$754,564 85

Cash Statement for Year Ending June 30, 1905.

		Dr.	
Cash on hand June 30, 1905		$ 2,960 05	
Cash in Bank—			
General Fund	$46,908 01		
Sinking Fund	26,308 72		
Hurlbut Fund	822 05		
Secretary Fund	1,000 00		
		75,038 78	
Total receipts		751,604 80	
			$829,603 63
		Cr.	
Cash on hand June 30, 1906		$ 4,366 29	
Cash in Bank—			
General Fund	$23,004 14		
Check outstanding	24 50		
	$22,979 64		
Sinking Fund	16,969 81		
Hurlbut Fund	720 00		
Secretary Fund	1,000 00		
....		41,669 45	
Total disbursements		783,567 89	
			$829,603 63

THE AMERICAN EXCHANGE NATIONAL BANK.

Detroit, Mich., July 1, 1906.

Benj. F. Guiney, Secretary, Board of Water Commissioners of the City of Detroit, Mich.:

DEAR SIR—This is to certify that the amounts of balances in this bank to the credit of the Board of Water Commissioners of the City of Detroit, at the close of business June 30, 1906, were as follows: General Fund, $23,004.14; Sinking Fund, $16,969.81; Hurlbut Fund, $720.00; Secretary Fund, $1,000.00.

Yours truly,
J. P. WILLIAMS,
Auditor.

Assessments, 1906-1907.

Dist.	Wards.	Families.				Increase.	Vacant Tenements.	Assessments.		
		Supplied by Meter	Assessed.	Not Supplied.	Whole Number.			1906–1907.	Increase.	Transf'rd to Meter Rolls.
1	Ninth..	535	6121	3	6,659	216	27	$20,717 62	$ 638 82	$194 80
	Fifteenth....	247	2766	1	3,014	314	9	14,286 96	1,885 66	94 20
	Seventeenth.	208	4092	10	4,810	688	15	20,970 07	3,261 97	189 80
	Total	990	12979	14	13,983	1218	51	55,974 65	5,786 45	478 80
2	Eleventh....	279	4527	1	4,807	243	20	17,670 08	1,232 08	171 40
	Thirteenth.	331	4206	1	4,538	360	36	17,968 19	1,595 89	79 30
	Total	610	8733	2	9,345	603	56	35,638 27	2,827 97	250 70
3	First..	1,268	3223	....	4,491	349	64	22,636 83	1,596 43	183 90
	Seven'h	447	3491	2	3,940	101	22	12,940 74	569 44	197 50
	Total	1,715	6714	2	8,431	450	86	35,577 57	2,165 87	381 40
4	Third..	794	3638	3	4,435	108	30	17,259 88	923 98	86 80
	Fifth..	572	4486	2	5,060	213	42	17,970 70	991 00	199 20
	Total	1,366	8124	5	9,495	321	72	35,230 58	1,914 98	286 00
5	Second	1,009	1982	1	2,992	152	39	17,881 34	711 44	76 47
	Sixth..	795	3937	....	4,732	112	37	18,968 78	584 48	51 37
	Total	1,804	5919	1	7,724	264	76	36,850 12	1,295 92	127 84
6	Tenth.	487	4980	4	5,471	32	67	22,608 86	1,010 56	158 90
	Fourteenth.	219	3643	21	3,883	333	47	16,110 62	1,233 12	186 50
	Total	706	8623	25	9,354	365	114	38,719 48	2,243 68	345 40
7	Fourth.	855	3386	6	4,247	351	20	19,926 34	1,236 84	114 50
	Twel'th	238	4234	6	4,478	178	26	18,108 72	1,256 62	59 00
	Total	1,093	7620	12	8,725	529	46	38,035 06	2,493 46	173 50
8	Eighth.	476	4359	3	4,838	372	23	20,341 76	1,378 66	112 50
	Sixteenth.	294	5728	22	6,044	443	36	2[illegible],055 50	1.545 60	166 00
	Total	770	10087	25	10,882	815	59	43,397 26	2,924 26	278 50
—	Eighteenth.	160	2835	708	3703	3703	18	10,585 04	10,585 04	......
—	Grand Total	9,214	71634	794	81,642	8,268	578	$330,008 03	$32,237 63	$2,322 14

RECEIPTS OF WATER RATES BY DISTRICTS,

From July 1st, 1905, to July 1st, 1906.

YEARS.	First District Wards 9, 15 and 17	Second District Wards 11 and 13	Third District Wards 1 and 7	Fourth District Wards 3 and 5	Fifth District Wards 2 and 6	Sixth District Wards 10 and 14	Seventh District Wards 4 and 12	Eighth District Wards 8 and 16	Ninth District Ward 18	Meters	Total
1896–97						$ 3 75	$ 1 50				$ 5 25
1897–98						3 50	1 13				4 63
1898–99						2 00					2 00
1899–00					$ 6 00	2 50	2 00				10 50
1900–01						3 10					3 10
1901–02					5 70	3 85					9 55
1902–03		$ 2 60		$ 5 95	5 70	3 10					17 35
1903–04		13 10		2 60	17 39	11 95		$ 8 95			53 99
1904–05	$ 1,606 53	429 35	$ 913 36	1,298 35	1,054 50	697 17	919 66	1,067 26			7,986 18
1905–06	52,207 69	33,822 53	33,915 44	33,532 31	35,726 97	37,599 71	36,324 83	41,350 80	$ 2,257 67	$ 186,520 94	493,258 89
Total..	$53,814 22	$34,267 58	$34,828 80	$34,839 21	$36,816 26	$38,830 63	$37,249 12	$42,427 01	$ 2,257 67	$ 186,520 94	$ 501,351 44

Estimated Valuation of Works.

Real estate	$ 462,828	60
Buildings, docks, basins, tunnel and crib, engines, etc., at pumping station	2,633,815	95
Water pipe in use	4,836,451	79
Office furniture and fixtures	9,466	01
Meters in use	110,966	48
Tools and materials on hand:		
In office of Civil Engineer	25,529	93
In office of Superintendent of Construction	645	00
In Inspection Department	123	75
In Meter Department	3,979	63
In Pumping Works Department	15,872	20
In Hurlbut Fund Department	2,100	92
In Service Connection Department	2,122	78
At Storage Yards	68,945	45
	$8,172,848	49

The amount expended for the Pumping Works to July 1st, 1906.

	Previously Expended.	July, 1906.	Total.
Land	$38,331 44	21,156 85	$59,488 29
Force Mains	624,058 03		624,058 03
Inlet Pipe	104,257 36		104,257 36
Docks, Basins and Canal	152,923 86		152,923 86
Conduits and Wells	300,453 98	9,992 79	310,446 77
Engine, Boiler, Coal Houses and Chimney	331,810 03	9,999 84	341,809 87
Stand Pipe and Tower	31,674 25		31,674 25
Pump Wells	54,221 56		54,221 56
Engines	565,728 87	79,390 83	645,119 70
Boilers	96,951 27	10,493 17	107,444 44
Engineer's House	8,415 93		8,415 93
Sewers	6,666 25		6,666 25
Electric Light Plant	3,187 40		3,137 40
Inspection	6,422 54	1,090 00	7,512 54
New Gallery	8,249 10		8,249 10
Traveling Crane and Coal Cars	2,390 00	200 00	2,590 00
Grounds, Fences and Gateway	183,950 85	9,164 04	193,114 89
Library, Greenhouse and Belvedere	36,014 81		36,014 81
Tunnel and Crib	149,232 73	51,388 21	200,620 94
Miscellaneous	22,662 00	307 56	22,969 56
Totals	$2,727,552 26	$193,183 29	$2,920,735 55

Water Works Bonds.

The following table shows the whole history of the bonded indebtedness of the Board, in which it will be seen that the total amount of bonds issued is $2,800,000, of which $1,834,000 have been redeemed or refunded, leaving outstanding $966,000.

The $100,000.00 seven per cent. bonds which matured September, 1899, and $100,000.00 seven per cent. bonds which matured February 1st, 1900, were on the latter date refunded at three and one-half per cent. $100,000.00 of the $250,000.00 seven per cent bonds which matured August 1st, 1904, were refunded at 4 per cent.

No. of Issue.	Act of	Issued.	Payable.	Amount.	Rate of Interest	Redeemed or Refunded	Outstanding.
1st	1853	Aug. 1, 1853	Aug. 1, 1883	$100,000	7cts.	$100,000	....
"	"	" "	Aug. 1, 1878	100,000	7 "	100,000	....
"	"	" "	Aug. 1, 1873	50,000	7 "	50,000	....
2nd	1855	Aug. 1, 1855	Aug. 1, 1890	100,000	7 "	100,000	....
"	"	June 12, 1855	Aug. 1, 1885	100,000	7 "	100,000	....
"	"	" "	Aug. 1, 1880	50,000	7 "	50,000	....
3rd	1857	Aug. 1, 1858	Aug. 1, 1893	150,000	7 "	150,000	....
"	"	Aug. 1, 1867	Aug. 1, 1887	100,000	7 "	100,000	....
* 4th	1869	Feb. 1, 1870	Feb. 1, 1900	100,000	7 "	100,000	....
5th	"	Aug. 1, 1872	Aug. 1, 1902	50,000	7 "	50,000	....
6th	"	Aug. 1, 1873	Aug. 1, 1903	50,000	7 "	50,000	....
"	1873	Feb. 1, 1874	Feb. 1, 1904	50,000	7 "	50,000	....
7th	1869	Aug. 1, 1874	Aug. 1, 1904	50,000	7 "	50,000	....
"	1873	" "	" "	200,000	7 "	200,000	....
"	"	June 1, 1875	June 1, 1905	150,000	7 "	150,000	16,000
"	"	June 1, 1876	June 1, 1906	200,000	6 "	184,000	....
* "	"	Sept. 1, 1880	Sept. 1, 1899	100,000	4 "	100,000	....
"	"	April 1, 1881	April 1, 1897	100,000	4 "	100,000	....
"	"	Dec. 1, 1881	Dec. 1, 1896	50,000	4 "	50,000	....
"	"	Jan. 10, 1895	Jan. 10, 1925	100,000	4 "	....	100,000
*Refund	1869 1873	Feb. 1, 1900	Feb. 1, 1930	200,000	3½"	....	200,000
	1873	Jan. 1, 1903	Jan. 1, 1933	50,000	3½"	....	50,000
	1901	Sept. 1, 1903	Sept. 1, 1933	150,000	3½"	....	150,000
	"	June 1, 1904	June 1, 1934	200,000	3½"	....	200,000
Refund	1873 1901	Aug. 1, 1904	Aug. 1, 1919	100,000	4 "	....	100,000
	1901	Feb. 1, 1905	Feb. 1, 1935	150,000	3½"	....	150,000
				$2,800,000		$1,834,000	$966,000

Respectfully submitted,
BENJ. F. GUINEY,
Secretary.

REPORT OF THE GENERAL MANAGER.

Detroit, Mich., July 1, 1906.

To the Board of Water Commissioners of the City of Detroit:

GENTLEMEN—I respectfully submit a report of the general operations of the works for the year ending June 30, 1906.

The assessment rolls of water rates show a gain over the previous year of $32,237.63. During the year places on the assessment rolls, with a total assessment of $2,322.14, were transferred to the meter rolls.

The increase of families on assessment rolls for the same period was 8,262, an increase of gain over the previous year of 4,981. Of the total increase the gain of families by the addition of the Eighteenth Ward was 3,703. The details of the number of families assessed in each ward and district, vacant tenements, number of families not assessed, and increase of assessments by wards, will be found by reference to the table of assessments in the report of the Secretary.

The total number of gallons of water pumped during the year was 22,395,312,104, of which 170,188,700 gallons were supplied to the village of Delray; 83,502,980 gallons to the village of Woodmere; 62,885,108 to the village of Hamtramck; 50,804,908 gallons to the village of River Rouge; 28,570,608 gallons to the village of Highland Park; 5,164,940 gallons to the village of Ecorse and 35,313,828 gallons to the village of Fairview.

The pumpage for the year was the largest in the history of the works, exceeding the previous year by 417,735,229 gallons.

The average daily consumption (including villages) was 61,357,019 gallons, an average daily increase of 1,144,480 gallons.

The highest day's pumpage was 79,957,100 gallons on February 6th, 1906, and the lowest was 48,739,890 gallons on November 19th, 1905.

The amount received for metered water was the sum of $186,520.94 of which amount the village of Delray paid $7,664.90; the village of Woodmere $3,441.75; the village of Hamtramck $2,838.36; the village of River Rouge $2,294.80; the village of Highland Park $1,294.28; the village of Ecorse $240.89 and the village of Fairview, $1,597.68.

Storage Grounds.

The buildings on the grounds are in good condition. The removal of the portion of the Iron Pipe Department, formerly located at the main office building, to the storage grounds necessitated providing additional office room. This was obtained by altering the lower floor of the pattern building dividing it into two rooms, one for the clerical force and the other for the use of the repair men and tappers. The Superintendent of Construction now resides on the grounds.

The consolidation of the department at the storage grounds has already been productive of very beneficial results.

The addition to the city of the villages of Delray, Woodmere and part of Springwells, which took effect April 1st, has made necessary a large amount of work outside the laying of pipe, and I again beg to call the attention of the Board to the necessity of establishing a western supply yard.

Pumping Station.

The grounds at the pumping station have received the usual care and present an extremely attractive appearance. Many thousands of visitors enjoyed its park features. An appropriation has been made by the Common Council and Board of Estimates to provide band concerts at least once a week during the summer season. Ice water fountains have been erected at various convenient points and other conveniences provided for the pleasure and comfort of the citizens. The fence along the west line of the park is undergoing extensive repairs.

In December, 1905, the Board purchased a tract of land adjoining the park on the east, known as the "Edwards Property," extending about 569 feet on Jefferson Avenue and with an average depth of about 860 feet. No improvements have been made to this section as yet with the exception of planting a double row of elm trees and the construction of an artificial stone side walk on Jefferson Avenue.

The two new Allis-Chalmers engines were accepted November 8th, 1905, and have been in active commission since that date.

The ten foot tunnel intake and crib house were completed and placed in commission December 18th, 1905, since which time the entire water supply has been taken from this source.

A contract was entered into with Wickes Brothers, of Saginaw, for furnishing three 333 1/3 horse power water tubelar boilers with stokers. These have been completed and are ready for test. Also with William Blay for the erection of a brick chimney, with stone trimmings, and 150 feet in heighth, which has been completed and accepted. A contract was awarded John Ginzel Co., for repairing and rebuilding approximately 725 lineal feet of the old dock and for dredging channel of canal 30 feet wide and 15 feet deep from draw bridge to end of pier. This work is progressing favorably.

The following Table shows the amount of water pumped each year from 1852 to 1906.

YEARS.	FAMILIES SUPPLIED.	WATER PUMPED.	
		TOTAL QUANTITY.	PER FAMILY.
1852	......	235,840,275	......
1853	4,283	303,531,743	70,868
1854	4,619	376,265,126	81,460
1855	5,282	542,807,364	102,765
1856	5,706	692.124,305	121,297
1857	6.189	697.190,523	112,650
1858	6,474	718,091,207	110,919
1859	6,794	782,112,587	115,118
1860	6.750	870,036.451	125,185
1861	7,128	895.129,423	125,579
1862	7,275	994,945,329	136,762
1863	7,699	1,035,798,043	134,534
1864	7,993	1,019,390,256	127,410
1865	8,351	1,040.514,887	125,675
1866	9,089	1,196,317,922	131,622
1867	10,242	1,425,535,230	139,186
1868	11,544	1,666,545,125	144,364
1869	12,774	1,946,810.325	152,400
1870	13,722	1,866,060.068	136,000
1871	14,896	2,300,150,605	154,414
1872	16.035	2,782,292,578	173,513
1873	17,019	3,198,393,948	187,930
1874	18.853	3,289,872.635	174,511
1875	19,606	4,207,454,260	214,600
1876	20,102	4,065,134,470	200,225
1877	20,345	4,213,239,790	207,090
1878	20,603	4,345,743 330	210,927
1879	21,341	5.129,599,110	240,348
1880	22,465	5,552.965,310	247,183
1881	23,749	6,543,127,968	279.722
1882	25,442	6,284,000,742	243,062
1883	27,415	7.379,327,788	269,170
1884	29,424	8,510,614,140	289.260
1885	30,533	9,970,829,580	326,886
1886	31,946	10,576,571.254	331,070
1887	34,486	13,168,859,808	381,860
1888	36,863	14,380,166,670	390,098
1889	39,158	12,875,334,453	328,880
1890	41,467	12,120.944,532	292,300
1891	43.933	12,057,261,236	274,470
1892	46,400	12,276.612,482	264,582
1893	49.817	13.877 977,208	278,579
1894	49,912	13,649,779,605	273,476
1895	51,426	14,698,451.954	285,818
1896	53,941	13,254,369 371	245,719
1897	54,945	12,928,821,326	235,305
1898	56,341	14,278.682,058	253,433
1899	58,931	16,348,062,701	277,410
1900	60,524	17,077,100,477	282,154
July, 1901 to July, 1902	64,718	18,333,104,706	283,320
July, 1902 to July, 1903	67,280	18,757,682,360	275,440
July, 1903 to July, 1904	70,087	21,734,954,234	* 305,131
July, 1904 to July, 1905	73,293	21,977,576,875	* 294,247
July 1905 to July, 1906	80 848	22,395 312,104	* 271,607

*436,431,072 gallons delivered outside Detroit; deducted from total pumped.

Pipeage System.

You are respectfully referred to the report of the Superintendent of Construction for details of the work in this department during the year.

The system was thoroughly flushed, all gates examined and repairs made where necessary, and dead ends regularly blown off.

A large amount of pipe, for increased fire protection, was laid during the year.

The total mileage of the distribution system July 1st, 1906, was 682 miles and 4165 feet, of which 621 miles and 823 feet are within the city and 61 miles and 3342 feet in the adjoining villages. Twenty-two miles and 2739 feet were laid during the year and 14155 feet discontinued or replaced by larger sizes, making a net increase of 19 miles and 4424 feet, of which 2418 feet were laid in the village of Delray; 6100 feet in the village of Woodmere; 10,486 feet in the village of Highland Park; 1100 feet in the village of Hamtramck; 16914 feet in the village of Fairview; said villages paying the entire cost thereof.

Data Detroit Water Works July 1, 1905 to July 1, 1906.

System of water works: Direct pressure. No reservoir.

Source of supply: Detroit River.

Number of pumping stations: One.

Type of pumps: One 30,000,000 Comp. Beam; two 24,000,000 Comp. Beam; one 24,000,000 triple Allis; two 25,000,000 triple Allis-Chalmers. Total daily capacity, 152,000,000.

Area of city: 36 square miles.

Population (Estimated) 377,532.

Pumpage: 22,395,312,104 gallons.

Consumption, gallons, unmetered: 15,856,871,316.

Consumption, gallons, metered: 6,538,440,788.

Average daily consumption: 61,357,019.
Consumption, per capita: 160 gallons.
Revenue, unmetered water: $314,830.50.
Revenue, metered water: $186,520.94.
Revenue, per 1,000 gallons metered water: .0285.
Revenue, per 1,000 gallons unmetered water: .019.
Number of meters: 6,346.
Kind of coal used: Bituminous, run of mine.
Price, per ton: $2.34 in sheds.
Average head against pumps in feet: 120.
Number of miles mains: 683.
Number of fire hydrants: 4,355.
Fire cisterns: 558. Capacity, 4,830,000 gallons.
Service taps: 73,699.
Gates: 8,014.

The following is the report of the Board of Health of examination of the water supply for the month of June, 1906.

Taken from Laboratory Tap.	Parts
Appearance—Nearly Clear.	Per Million.
Temperature	18.5° C.
Total solids	142.000
Volatile matter	52.000
Non volatile matter	90.000
Free ammonia	.030
Albuminoid ammonia	.058
Nitrogen as nitrates	.296
Nitrogen as nitrites	None
Chlorine	5.100
Oxygen absorbed in 15 minutes	.420
Oxygen absorbed in 4 hours	.680
Bacteria per cubic centimeter	178
Bacteria per cubic centimeter	130

Bacteria per cubic centimeter............................	193
Bacteria per cubic centimeter............................	270

Animal innoculations, 2. Both recovered.

Conclusion: Water is in satisfactory condition.

Respectfully submitted,
E. H. HAYWARD, M. D.,
Analyst and Bacteriologist.

All of which is respectfully submitted,

H. S. STARKEY,
General Manager.

REPORT OF THE CIVIL ENGINEER.

To The Board of Water Commissioners of the City of Detroit:

GENTLEMEN—I have the honor to submit the following Annual Report:

Intakes.

On July 23, 1905, the ten foot brick tunnel was completed. The crib was completed on December 3rd and the steel coffer dam removed from the river shaft three days later, letting the tunnel fill with water. The gates leading from the tunnel to the basin, and to the pumps were not opened at this time. The tunnel was well cleaned upon its completion in July. As an additional safeguard it was arranged to give it a thorough flushing before using it. This was accomplished by setting the gates so that Engine No. 1 could pump from the tunnel and waste through the old stand pipe into the canal. The pump was started at 2:45 P. M. Saturday, December 16th, and wasted 41,102,496 gallons in a continuous run of 39 hours. This is equivalent to about 16 times the quantity of water contained in the entire length of tunnel including wells.

At 5:40 A. M. December 18th, water from the new tunnel was pumped into the force mains for the first time.

All the valves controlling the old intake pipes were closed within a few days, since which time the entire supply has been through the new crib and tunnel. The old intakes are held in readiness for instant use in case of accident or emergency.

The only indication of anchor ice trouble during the entire season occured on January 24th when there was a slight accumulation of ice in the strainer wells in the rear of the station, and it was necessary to let down the emergency trap doors in one of the wells for a short time only.

Purity of Supply.

The entire system has been thoroughly flushed. Frequent Blow-offs have been made at all dead ends.

The typhoid death rate in the City from August to December inclusive was above the average. There were 44 typhoid deaths during this period, compared with an average of 33 for the preceeding five years.

Since December the supply of water has been taken through the new crib and tunnel, and the number of typhoid deaths has been below the average, the total number from January to June inclusive being 18 as compared with an average of 20 1-5 for the preceeding five years.

Construction.

The demand for extensions of small mains has been unusually large, a total of 317 requests and petitions having been received during the year. In each case, whether the petition is granted or not, it is necessary to make a plat and estimate, and to visit the ground at least once to determine the character of the buildings to be supplied and the best location for the pipe. In about two thirds of the cases it is necessary to make additional estimates on account of changes in the length or size of pipe, or the laying of additional pipe to cure dead ends. In this detail the work of the Engineering Department has been increased, though no large lines have been laid.

Several important fire lines have been laid in the manufacturing and business districts, and a few small feeders put in where required to supply the increasing demands in outlying districts. Attention is called to a few of the more important lines laid or authorized, as follows:

36 inch line on Mack from Cadillac to Hurlbut.

12 inch line on Mack from Hurlbut to St. Jean.

12 inch line on Harbough from Fort to Dearborn.

10 inch line on Milwaukee from St. Aubin to Hastings.
10 inch line on Beaubien from Harper to Boulevard.
10 inch line on Atwater from Woodward to Orleans.
10 inch line on streets between from Isabella to 18th.
10 inch line on Amsterdam from Woodward to 2nd.
10 inch line on Hancock from Woodward to 2nd.

The length and cost of all completed lines is given in detail in the report of the Superintendent of Construction.

The concrete foundation for the new 150 ft. brick stack at the pumping station was built under the direction of the Engineering Department and completed December 8th. The stack completed by others, was tested on June 27th and found to be only 1⅜ inches out of plumb, the top leaning seven eighths of an inch toward the east and one and three eighths toward the River.

On February 14th, The Board directed that the foundation of Engine No. 2. should be rebuilt and repaired under the joint supervision of the Civil Engineer and the Chief Engineer of the Pumping Station. The work is progressing as rapidly as could be expected. This engine was built in 1880 by Samuel F. Hodge of Detroit. It is of the compound beam type with double acting piston pumps. Capacity 24 million gallons per day. Maximum pressure 60 pounds.

On June 16th a contract was awarded to the John Ginzel Co., for rebuilding the dock at the pumping station grounds, the contract price being $10,174.82. The dangerous condition of the old pier made this work imperative and it is already under way with every prospect of early completion.

There have been no serious breaks in the pipe lines during the year and the service has been continuous. On February 6th, the 10 inch pipe supplying Belle Isle broke in the river. The water was about 8 feet deep and the pipe looked as if it had been crushed by the keel of a tug. The Park Board employed a diver and made repairs using a special sleeve.

Electrolysis.

The bonding system, inaugurated in 1896 as set forth in the Annual Report of that year, has been continued to the present time. Frequent surveys and tests have been made and additional bonds or returns attached to the pipes whereever it was found necessary in order to prevent damage.

Under this system there has been very little damage to either the cast iron mains or the lead service connections. It was feared, however, that there might be considerable damage going on at the joints. The Board therefore decided to have a thorough survey made by Mr. A. A. Knudson, who makes a specialty of this line of work. In this problem it is necessary to consider the water and gas systems as a unit for they parallel each other and come into frequent contact both in streets and in houses. The cooperation of the Gas Co., was secured, they agreeing to bear half the expense of the investigation.

The field work occupied about six weeks and a number of additional bonds were made under Mr. Kundson's personal supervision.

In his final report Mr. Kundson says:

"We are of the opinion that it is not wise to depend upon the bonding method as a final cure for electrolysis*** While the complete metallic circuit such as in practical use in New York, Washington and Cincinnati, (conduit systems and double overhead trolley) has not come into general use, the tendency at least among large railway systems,*** is in that direction and something of this kind should be adopted in Detroit."

It is also recommended pending such installation that the heavy currents on both water and gas mains be reduced by laying heavy copper returns in the vicinity of the power house, and that the systems of bonding between water, fire and gas mains be maintained and extended under certain conditions, to prevent damage to all under ground systems. In the words of the report "Where such a system has been in vogue for several years, as in Detroit, it is not advisable to make any sudden or radical change without first having a substitute in use known to be equally efficient."

The efficiency of the bonding system in protecting the water pipes during ten years of trial is shown by the following statement taken from the report:

"Many joints have been examined, both gas and water, in the cast iron mains, interior as well as exterior. The result has been that while in some cases evidence of electrolytic action has been found, as a whole no serious damage can be reported. The joints examined were from 4 inch up to 12 inch. As a rule sizes above 12 inch are not as much affected as the smaller ones, owing to greater surface contact of the metals and consequent lower resistance." Again "No damage of importance caused by electrolysis has been discovered upon the water mains or service pipes."

As a result of this report both the Gas Co., and Fire Department have adopted the bonding system to prevent further damage to their pipes, and the recommendations of the report are being carried out in detail as far as possible.

Population and Consumption.

On April 1st, the villages of Delray and Woodmere were taken into the City. This with other territory annexed added 3,703 families to the City. The report of the Secretary shows a total of 81,642 families, of which 794 are not supplied, and 242 are outside of the limits. Estimating on the conservative basis outlined in the Annual Report for 1904, on page 44 the population of the City is 377,208 and the number of persons supplied exclusive of villages is 374,650.

The Board does not include the villages in its census. It is therefore necessary to estimate the number of persons supplied from the number of taps in each village at the city rate of 5.206 *persons per tap, as follows:

VILLAGE.	NO. TAPS.	ESTIMATED No. OF PERSONS SUPPLIED.
River Rouge	613	3,191
Ecorse	116	604
Highland Park	245	1,275
Hamtramck	448	2,332
Fair View	316	1,645
TOTAL	1738	9,047

* 374, 650 ÷ 71, 916 = 5, 206.

The total number of gallons supplied and the per capita consumption is given in the following table:

CORPORATION SUPPLIED.	U. S. GALLONS SUPPLIED July 1, 1905 to June 30, 1906, inclusive.		Estimated Number of Persons supplied.	Gallons per Capita Daily.	
	Total.	Daily Average.		1905-6	1904-5
Detroit, unmetered.	15,738,016,360	43,117,845	374,650	162.4	172.8
Detroit, metered	6,474,556,352	17,738,510			
River Rouge, metered	50,804,908	139,192	3,191	43.6	43.3
Ecorse, metered	5,164,940	14,151	604	23.4	26.5
Highland Park, metered	28,570,608	78,276	1,275	61.4	71.7
Hamtramck, metered	62,885,108	172,288	2,332	73.9	84.2
Fair View, metered	35,313,828	96,750	1,645	58.8	......
TOTALS	22,395,312,104	61,357,019	383,697	159.9	167.9

The estimated increase in the total number of persons supplied is 25,069 and the per capita consumption decreased from 167.9 to 159.9 gallons per day.

The maximum, minimum and average daily quantity of water supplied to the high and to the low pressure system is as follows:

High Pressure System.	Gallons
Maximum day Feb. 7, 1906	15,817,500
Minimum day Nov. 26, 1905	5,925,000
Average daily	11,357,738
Total for year	4,145,574,500
Low Pressure System.	
Maximum day Feb. 6, 1906	64,267,100
Minimum day Nov. 5, 1905	38,779,615
Average daily	49,999,281
Total for year	18,249,737,604
Combined System.	
Maximum day Feb. 6, 1906	79,957,100
Minimum day Nov. 15, 1905	47,359,615
Average daily	61,357,019
Total for the year	22,395,312,104
Maximum hour, 4 to 5 P. M. June 18th, 1906.	4,209,420
Minimum hour 2 to 3 A. M. Nov. 27th, 1905.	1,493,640

The precipitation, temperature and number of gallons of water pumped each day of the year is graphically shown on the following plates. Weather conditions have been generally favorable for light consumption throughout the year.

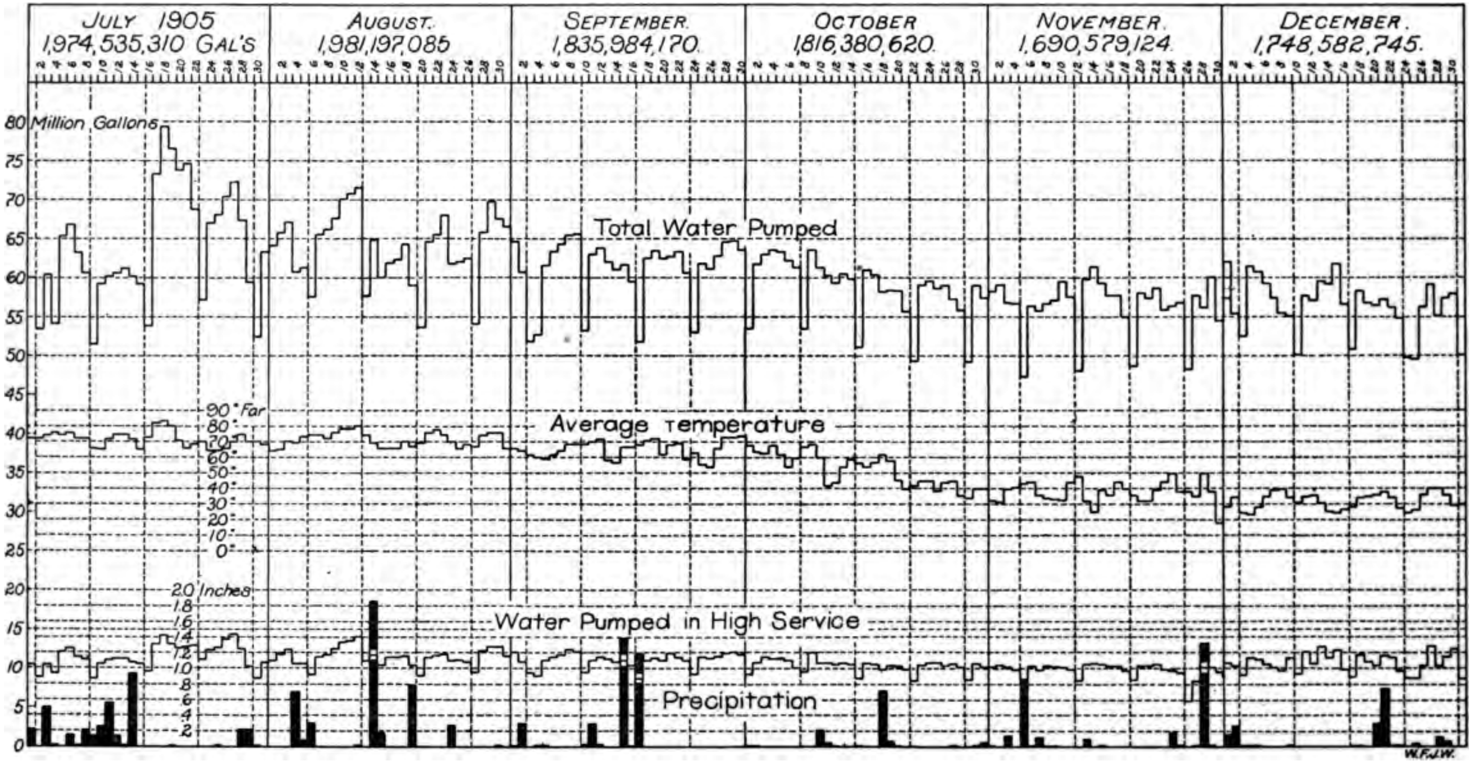
PRESSURES.

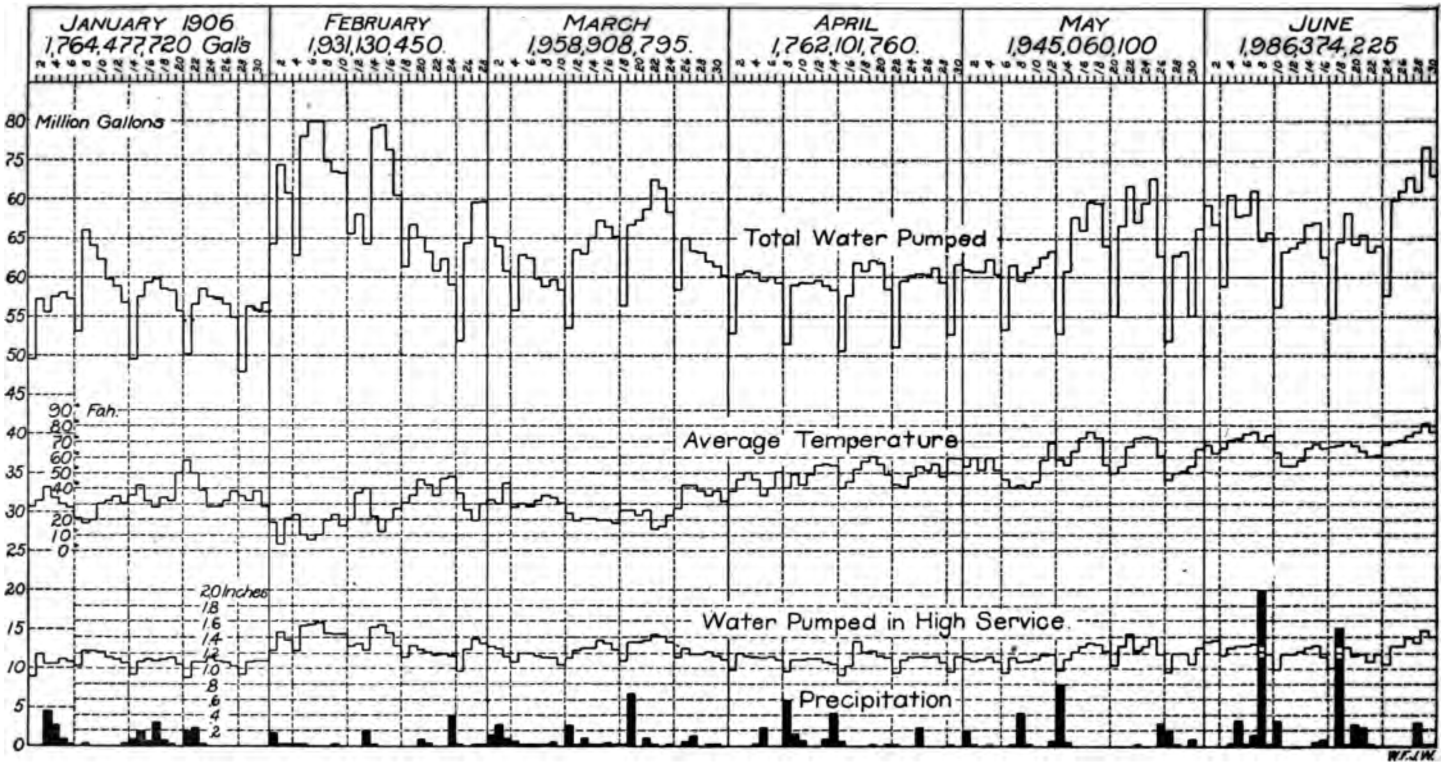
The pressures throughout the city have remained about the same as for the preceeding year as is shown in the accompanying table. The lowest average pressure was 18.43 lbs. at the storage yard and the higest 36.07 at Fire Engine House No. 18 on Mt. Elliott near Sylvester. The average pressure at the pumps was 52.11 lbs. on the low, and 62.13 on the high service, with a range from 42 to 75 pounds.

	LOCATION OF GAUGES.	Elevation above City datum.	Elevat'n pounds above surface pump wells 92.00 at which engine gauges are set	AVERAGE DAILY GALLONS 60,212,539 JULY 1, 1904 TO JUNE 30, 1905				AVERAGE DAILY GALLONS 61,357,019 JULY 1,1905 TO JUNE 30,1906				Increase or Decrease Friction during last year		Maximum hour observed Feb. 14, 1905. 4,548,830 Gals 9 to 10 a. m. Daily Rate 109,171,920 Gals.		Maximum hour observed July 18, 1905 4,209,420 Gals. 4 to 5 p. m. Daily Rate 101,026,080 Gals.	
				PRESSURES, POUNDS.			Fric. Loss, Lbs.	PRESSURES, POUNDS.			Fric. Loss, Lbs.	Pounds		Average Pressure Lbs.	Fric. Loss, Lbs.	Average Pressure Lbs.	Fric. Loss Lbs.
		Feet.		High.	Low.	Mean. 8784 read.		High.	Low.	Mean. 8760 read.		Inc.	Dec.				
Low Service	Pumping Station,	92.00	....	60	44	52.04	......	60	42	52.11	....	......	......	59.50	....	59 00	....
	Engine No. 26, Crane and Brinket	125.787	14.62	47	28	35.74	1.68	47	28	35.79	1.70	0.02	......	42.00	2.88	38.00	6.38
	Engine No. 7, Concord near Jefferson	124.773	14.19	42	30	35.81	2.54	42	27	35.27	2.65	0.11	......	38.00	7.31	35 50	9.31
	Truck No. 6, Elmwood and Fort	124.495	14.07	39	28	33.31	4.66	38	24	30.10	7.94	3.28	......	35.50	9.93	31.00	13.93
	Engine No 2, Hastings near Congress	120 981	12.55	37	25	30.99	8.50	36	25	30.72	8.84	0.34	.....	28.00	18.95	31 00	15.45
	Water Office, Randolph and Jefferson	125.176	14.36	33	23	28.32	9.36	33	23	28.30	9.45	0.09	......	23.50	21.64	27.50	17.14
	Truck No. 1, Wayne and Larned	116.738	10.70	36	23	31.04	10.30	36	24	30.78	10.63	0.33	......	27.50	21.30	29 50	18 80
	Engine No. 3, Griswold and Clifford	123.059	13.44	35	23	30.00	8.60	37	24	30.13	8.58	......	0.02	27.00	19.06	29.00	16 56
	Engine No. 8, Sixth and Baker	122.144	13.05	35	21	28.44	10.55	34	22	28.66	10.40	......	0.15	23.00	23.45	25.50	20.45
	Engine No. 4, Eighteenth near Howard	116.179	10.47	35	18	30.22	11.35	36	24	30.51	11.13	......	0.22	24.00	25.03	26 50	22.03
	Truck No. 4, Twentieth near Rose	124 825	14.21	32	15	25.88	11.95	33	20	26.90	11.00	......	0.95	24.50	21.19	22 50	22.29
	Engine No. 10, Sixteenth and Bagg	125.282	14.41	34	16	27.39	10.24	35	21	27.70	10.00	......	0.24	21.00	24.09	25 00	19.59
	Engine No. 15, Hubbard near Fort	114.617	9.79	35	14	30.13	12.12	37	22	31.10	11.22	......	0.90	25.00	24.71	27.00	22.21
	Engine No. 27, Junction and Rogers	113.736	9.41	38	15	30.94	11.69	39	23	31 58	11.12	......	0.57	27.50	22.59	25.00	24.59
	Engine No. 14, Scotten near Michigan	121.369	12.71	36	17	29.02	10.31	34	21	28.33	11.07	0.76	......	26.50	20.29	25 00	21.29
	Engine No. 22, Michigan near Hammond	119.444	11.88	35	15	27.13	13.03	35	20	27.70	12.53	0.50	......	19.00	28.62	22.00	25.12
	Truck No. 10. Sheridan and Mack	140.254	20.89	40	21	27.81	3.34	37	20	27.96	3 26	......	0.08	32.50	6.11	33.00	5.11
	Engine No. 18, Mt. Elliott near Sylvester	146.233	23.48	35	19	24.69	3.87	34	19	25.07	3.56	......	0.31	27.50	8.52	28.50	7.02
	Engine No. 11, Grandy and Gratiot	143.211	22.17	30	19	24.97	4.90	31	20	25.50	4.44	......	0.46	25.50	11.83	27.00	9.83
	Engine No. 6, High near Hastings	142.631	21.92	27	15	20 46	9.66	28	15	20.68	9.51	......	0.15	19.00	18.58	18.50	18.58
	Storage Yard, Erskine near Riopelle	150.635	25.38	25	12	18 20	8.38	25	12	18.43	8.30	......	0.08	18 50	15.62	18.00	15.62
	Truck No. 5, Russell and Erskine	147.742	24.13	24	13	19.04	8.87	25	12	19.00	8.98	0.11	......	17.00	18.37	19.00	15.87
	Engine No. 5, Alexandrine near Cass	146.693	23.68	23	12	19.06	9.30	25	13	18.91	9.52	0.22	......	15.00	20.82	19.00	16.32
	Engine No. 12, Sixteenth and Grand River.	141.546	21.45	26	10	20.03	10.56	27	14	20.30	10.36	......	0.20	16.00	22.05	17.50	20.05
	Engine No. 20, Baldwin and Gratiot	145.368	23.10	36	19	27.37	1.57	34	18	26.31	2.70	......	1.13	30.00	6.40	31.50	4.40
High Service.	Pumping Station,	92.00	....	83	53	59.95	....	75	55	62.13	....	......	......	80.00	....	69.50	....
	Engine No. 18, Mt. Elliott near Sylvester	146.233	23.48	49	25	34.43	2.04	46	27	36 07	2.58	0.54	......	42.00	14.52	41.50	4.52
	Engine No. 23, Moran and Boulevard	154.288	26.96	43	23	29.51	3.48	40	24	30.70	4.47	0.99	......	33.00	20.04	33.00	9.54
	*Engine No. 28, Riopelle and Milwaukee	155.556	27.52	34	23	27.89	4.54	36	22	28.71	5.90	1.56	......	....	*........	28.00	13.98
	Engine No. 13, Russell and Ferry	157.304	28.27	42	17	27.06	3.62	38	22	29.84	4 02	0.40	......	28.50	23.23	29.50	11.73
	Engine No. 17, Cass near Amsterdam	152.825	26.33	42	21	29.03	4.59	38	23	29 71	6.09	1.50	......	28.00	25.67	30.00	13.17
	Engine No. 21, Lincoln near Piquette	154.880	27.22	42	14	28.98	3 .75	38	22	30.24	4.67	0.92	......	26.00	26.78	28.00	14.28
	Engine No. 24, Mott near John R	155.855	27.64	39	17	26.97	5.34	37	22	28.39	6.10	0.76	.. ..	26.00	26.36	27.50	14.36

* **Engine No. 28 went into commission May 1, 1905.**

DAILY WATER CONSUMPTION, AVERAGE TEMPERATURE AND PRECIPITATION.




JANUARY 1906
1,764,477,720 Gal's
FEBRUARY
1,931,130,450.
MARCH
1,958,908,795.
APRIL
1,762,101,760.
MAY
1,945,060,100
JUNE
1,986,374,225
Million Gallons
80
75
60
65
60
55
50
45
40
35
30
25
20
15
10
5
0
90° Fah.
80
70
60
50
40
20
10
0
20 Inches
18
16
14
12
10
8
6
4
2
Total Water Pumped
Average Temperature
Water Pumped in High Service
Precipitation
W.F.J.W.

The office force continues in a well organized and efficient condition.

The changes in the office building giving the Engineering Department new quarters will be a substantial improvement when completed, especially so as it will provide a modern steel vault for the preservation of our records, many of which could not be replaced.

Respectfully submitted,
CLARENCE W. HUBBELL,
Civil Engineer.

REPORT OF SUPERINTENDENT OF METERS AND INSPECTION.

Detroit, July 2, 1906.

To the Board of Water Commissioners:

Gentlemen—In compliance with the rules and regulations of your honorable body, I herewith report the work done in the Meter, Inspection and Service Cocks Departments from July 1, 1905, to July 1, 1906:

NUMBER OF METERS PLACED FROM JULY 1, 1905, TO JULY 1, 1906.

	SIZES.								
	⅝ in.	¾ in.	1 in.	1½ in.	2 in.	3 in.	4 in.	6 in.	Total
In service July 1, 1905	3,097	1,147	1,013	337	280	116	65	21	6,076
Placed during the year ending June 30, 1906	259	103	78	28	36	16	11	1	532
Add meters received from Delray and Woodmere	16	7	19	5	6	8	7	......	63
	3,372	1,257	1,110	370	322	135	83	22	6,671
Deduct meters removed during the year ending June 30, 1906	227	31	29	4	20	7	3	4	325
Total number in service July 1st, 1906	3,145	1, 226	1,081	366	302	128	80	18	6,346

IN SERVICE JULY 1, 1906.

KIND.	SIZES.								
	⅝ in.	¾ in.	1 in.	1½ in.	2 in.	3 in.	4 in.	6 in.	Total
Thomson	3,130	1,218	1,051	358	292	123	67	18	6,257
Crown	8	5	11	6	2	3	2	......	37
Hersey	1	1	16	2	4	......	6	......	30
Worthington	2	2	3	......	4	2	3	......	16
Union Rotary	2	......	......	......	......	......	1	......	3
Buffalo	1	......	......	......	......	......	......	......	1
Trident	1	......	......	......	......	......	......	......	1
Keystone	......	......	......	......	......	......	1	......	1
Aggregate	3,145	1,226	1,081	366	302	128	80	18	6,346

Indicators attached to hydraulic elevators 35

METERS IN STOCK.

KIND.	SIZES.							
	5/8 in.	1 in.	1¼ in.	2 in.	3 in.	4 in.	6 in.	Total
Thomson	2	2	4	5	2	......	4	19
Crown	......	......	2	2	......	1	......	5
Hersey	......	9	......	1	......	1	......	11
Worthington	......	......	.....	.....	1	......	......	1
Total	2	11	6	8	3	2	4	36

Valuation of meters in stock July 1, 1906	$2,223 60
Valuation of material on hand July 1, 1906	648 56
Valuation of tools, etc., July 1, 1906	546 47
Valuation of horses, wagons, etc., July 1, 1906	456 00
Valuation of furniture, fixtures, etc., July 1, 1906	105 00
Total valuation of stock on hand July 1, 1906	$3,979 63

Valuation of meters in service July 1, 1905		$106,467 67
Deduct 2 per cent. for depreciation in value	$2,129 35	
Deduct for meters sold	263 50	2,392 85
		$104,074 82
Add amount expended for meters placed 1905–6		6,891 66
Total valuation of meters in service July 1, 1906		$110,966 48

SUMMARY OF TOTAL AMOUNT EXPENDED IN THE METER DEPARTMENT FOR THE YEARS 1889 TO JULY 1, 1906, INCLUSIVE.

	1889	1890	1891	1892	1893	TOTAL
Meters.................	$11,175 00	$18,700 00	$6,501 55	$12,871 82	$6,987 43	$ 55,735 80
Supt. and labor........	1,734 10	8,510 57	4,841 49	8,269 17	8,980 48	32,335 81
Material, tools, etc....	637 26	2,982 14	872 99	2,132 98	1,650 33	8,275 65
Freight, hauling, etc..	98 05	408 97	197 11	244 08	165 12	1,113 33
Horses, wagon, etc....	....	....	....	547 24	184 50	731 74
Aggregate........	$13,644 41	$30,601 68	$12,413 14	$23,565 24	$17,967 86	$ 98,192 33

	1894	1895	1896	1897	1898	TOTAL
Meters.................	$8,824 08	$9,235 11	$10,435 76	$7,955 97	$1,790 75	$ 38,241 67
Supt. and labor........	6,672 20	6,647 89	6,340 08	6,078 78	4,531 11	30,270 06
Material, tools, etc....	1,833 01	1,384 85	1,035 15	927 90	568 99	5,749 90
Freight, hauling, etc..	201 18	71 40	91 11	67 90	13 16	444 75
Horses, wagon, etc....	383 07	248 60	238 51	330 80	187 50	1,388 48
Aggregate........	$17,913 54	$17,587 85	$18,140 61	$15,361 35	$7,091 51	$ 76,094 86

	1899	1900-1	1901-2	1902-3	1903-4	TOTAL
Meters.................	$2,265 70	$4,172 61	$4,801 12	$ 4,316 72	$4,401 82	$ 19,957 97
Supt. and labor........	4,223 54	6,369 45	4,597 96	5,319 54	5,144 01	25,654 50
Material, tools, etc.....	375 32	617 71	521 69	577 61	360 45	2,452 78
Freight, hauling, etc..	6 85	15 00	1 60	3 37	59	27 41
Horses, wagon, etc....	244 25	321 15	220 10	238 00	473 30	1,496 80
Aggregate.........	$7,115 66	$11,495 92	$10,142 47	$10,455 24	$10,380 17	$49,589 46

	1904-5	1905-6		Total Expended Since 1889.
Meters.................	$5,238 75	$6,891 66	....	$126,065 85
Supt. and Labor.......	5,171 79	5,043 62	....	98,475 78
Material, tools, etc....	271 09	196 67	....	16,946 09
Freight, hauling, etc..	1 80	....	....	1,587 29
Phone and Printing...	88 20	62 60	....	150 80
Horses, Wagon, etc...	275 50	234 50	....	4,127 02
Aggregate........	$11,047 13	$12,429 05		$247,352 83

Two hundred and seventy meters were added to the system during the past year, sixty-three of which were in the villages of Delray and Woodmere, which were annexed to the city on April 1st of the present year, making the total number of meters in service 6,346.

All of the meters have been removed from premises that formerly paid by meter but are now paying by assessed rates, and have been placed on apartment houses, business places, etc.

Under instructions from the General Manager the meters were removed from the Belle Isle Park main on June 12th of the present year. We also removed the meters from the Woodmere line (two six inch) and three of the same size are to be removed from the Delray line, which, with the two from Belle Isle, will give the department seven six-inch meters that can be used on factories that require large quantities of water. In fact, two have already been placed on such and another is nearly ready for one. They will all undoubtedly be in service again at no very late date.

Inspection.

The following is a portion of the work done in this department during the year.

New connections examined—City	3,597
" " " Hamtramck	80
" " " Highland Park	78
" " " Fairview	99
Extensions examined	1,140
Buildings examined	9,004
Fixtures inspected	6,284
Let on vacant, re-occupied	658
Let on non-payment	496
Let on new connections	3,208
Building tax notices	5,849
Delinquents notified	22,842
Shut off for non-payment	491
Shut off for vacancy	698
Shut off for leaks	263
Inquiries for Assessors and Collectors	7,394
Meters read	42,236
Meter bills delivered	22,939
Examination for leaks	8,197
Leaks reported	708
Total	136,261

Service Cocks.

Thirty-five hundred and ninety-seven service connections were made in the city during the year, 200 of which were made in the new Eighteenth ward from April 1st to July 1, 1906. This shows an increase of nearly 25 per cent over the previous year.

The following tables show in detail the number, sizes and wards in which they were inserted. Also the number and sizes of all service connections in the adjoining villages of Highland Park, River Rouge, Ecorse, Hamtramck and Fairview.

Table showing the number and sizes of taps inserted, and those discontinued, in each ward from July 1, 1905, to July 1, 1906. Also those added by the annexation of the Villages of Delray and Woodmere.

INSERTED.	WARDS.																			Add number from Delray and Woodmere villages annexed April 1, 1906.		Total No. added to City from July 1, '05 to J'y 1'06
SIZES.	1	2	3	4	5	6	7	8	9	10.	11	12	13	14	15	16	17	Fm. Ap.1 18	To'al.	From July 1,'05 to April 1, '06.	Previous to July 1, '05.	
⅝-inch	61	11	70	75	137	30	56	85	125	62	122	159	195	167	145	337	519	189	2,545	276	1,944	4,765
1-inch	89	66	51	156	40	28	19	75	27	41	34	41	32	35	86	25	96	8	949	10	153	1,112
2-inch	6	9	3	5	1	3	5	3	4	1	1	4	1	3	1	1	1	1	53		8	61
3-inch	...	1	...	2	...	...	1	...	3	1	...	2	...	1	2	4	2	...	19		4	23
4-inch	...	3	1	2	...	...	...	...	...	1	...	...	...	2	...	1	...	2	12		2	14
6-inch	1	2	...	1	...	1	4	...	...	2	...	1	...	1	...	1	...	...	14		4	18
8-inch	...	...	...	...	...	...	...	2	...	...	...	...	...	...	3	...	...	...	5			5
Aggregate	157	92	125	241	178	62	85	165	159	108	157	207	228	209	237	369	618	200	3,597	286	2,115	5,998
DISCONTINUED.																						
⅝-inch	18	18	8	4	17	2	14	4	5	4	5	3	1	3	6	6	...	...	118	...	...	...
1-inch	3	4	1	2	...	...	...	3	...	1	...	1	1	...	...	1	...	...	17	...	...	...
Aggregate	21	22	9	6	17	2	14	7	5	5	5	4	2	3	6	7	...	...	135	...	...	...

Service connections in the villages of Highland Park, River Rouge, Ecorse, Hamtramck and Fairview.

VILLAGES	IN USE JULY 1, 1906.						INSERTED IN 1905-6.			TOTAL.	TOTAL CONSUMPTION.
	⅝-in.	1-in.	2-in.	3-in.	4-in.	6-in.	⅝-in.	1-in.			Gallons.
Highland Park	98	64	1	1	.....	1	63	17	.....	245	28,570,608
River Rouge	486	11	....	.....	1	.....	112	3	....	613	50,804,908
Ecorse	88	1	.....	.....	....	.....	27	.....	.....	116	5,164,940
Hamtramck	352	14	1	... .	3	.....	74	4	.....	448	62,885,108
Fairview	187	26	2	.....	2	.....	83	16	.....	316	35,313,828
Aggregate	1.211	116	4	1	6	1	359	40	.....	1,738	182,739,392
Belle Isle Park	......	.....	.....	.....	.....	.....	......	.....	.....	....	258,742,924
Palmer Park	......	.....	....	.....	.....	.. ..	......	.....	.....	....	12,934,416
Aggregate	......	.....	.....	.....	.....	.....	......	.....	.....	....	271,677,340

TOTAL NUMBER OF SERVICE CONNECTIONS IN THE CITY AND ADJOINING VILLAGES, JULY 1st, 1906.

SIZES.	In Use July 1, 1905.	Added 1905-6	Discontinued 1905-6.	Total. July 1, '06
⅝-inch	48,509	4,765	118	53,156
1 "	16,615	1,112	17	17,710
2 "	492	61	....	553
3 "	258	23	....	281
4 "	169	14	....	183
6 "	53	18	....	71
8 "	1	5	....	6
10 "	1	....	....	1
Total, City	66,098	5,998	135	71,961
" Villages				1,738
Aggregate				73,699

Attached to this report is a complete list of tools on hand and an itemized account of material in stock in the meter and inspection departments on the first day of July, 1906.

All of which is respectfully submitted,

T. R. PUTNAM,
Supt. Meters and Inspection.

REPORT OF CHIEF ENGINEER AT PUMPING WORKS.

Detroit, July 1, 1906.

To the Board of Water Commissioners:

Gentlemen — I have the honor to submit the Engineer's report for the year ending June 30, 1906.

The following table shows the number of gallons of water pumped, and cost of fuel for the years named:

YEAR.	GALLONS OF WATER PUMPED.	COST OF FUEL CONSUMED.	AVERAGE DAILY DELIVERED.
1852	235,840,271		646,411
1853	308,531,743	$ 2,129 37	931,594
1854	376,265,126	2,271 34	1,030,866
1855	542,807,364	3,325 81	1,487,143
1856	692,124,305	4,017 44	1,896,231
1857	697,190,523	3,993 20	1,909,837
1858	718,091,207	3,655 20	1,967,373
1859	782,112,587	3,194 15	2,142,774
1860	870,036,451	4,196 21	2,383,580
1861	895,129,423	4,414 07	2,452,409
1862	994,945,829	3.150 95	2,725,878
1863	1,035,798,043	4,670 86	2,837,803
1864	1,018,390,256	7,647 62	2,839,078
1865	1,049,514,887	7,372 89	2,875,383
1866	1,196,317,922	9,349 16	3,277,583
1867	1,425,535,230	10,121 82	3,905,576
1868	1,666,545,125	11,379 23	4,507,248
1869	1,946,810,325	11,247 92	4,511,809
1870	1,866,060,068	12,713 78	5,112,493
1871	2,300,150,605	14,681 05	6,301,782
1872	2,782,292,578	17,736 86	7,601,392
1873	3,198,393,948	20,233 30	8,762,723
1874	3,289,872,635	20,431 71	9,013,350
1875	4,207,454,260	21,393 98	11,527,272
1876	4,065,134,470	19,832 89	11,107,499
1877	4,213,239,790	17,433 72	11,543,123
1878	4,345,743,330	10,943 82	11,906,146
1879	5,129,599,110	11,219 51	14,053,696
1880	5,552,965,310	12,276 60	15,172,036
1881	6,543,127,968	16,556 63	17,926,877
1882	6,284,000,742	13,156 16	17,261,440
1883	7,379,327,188	16,495 99	20,217,334
1884	8,510,614,140	19,877 07	23,253,044
1885	9,970,829,580	21,341 48	27,317,341
1886	10,576,571,254	20,387 24	28,976,907
1887	13,168,859,808	35,882 83	36,079,166
1888	14,380,166,670	39,568 66	39,397,716
1889	12,875,334,453	34,413 31	35,274,888
1890	12,120,944,532	31,852 40	33,209,067
1891	12,057,261,236	33,826 86	33,033,592
1892	12,476,612,482	31,034 40	34,182,499
1893	13,877,977,208	27,479 93	38,021,855
1894	13,649,779,605	29,283 47	37,396,656
1895	14,698,451,954	32,095 00	40,269,731
1896	13,254,369,371	31,186 17	36,215,123
1897	12,928,821,326	17,355 58	35,421,428
1898	14,278,682,058	17,880 19	39,092,252
1899	16,348,062,701	19,011 67	44,789,212
1900	17,077,100,477	25,398 50	46,786,576
January 1 to July 1, 1901	8,849,732,755	16,881 31	48,893,551
July 1, 1901, to July 1, 1902	18,333,104,706	24,830 79	50,200,204
July 1, 1902, to July 1, 1903	18,757,682,360	26,909 99	51,390,911
July 1, 1903, to July 1, 1904	21,734,954,234	38,461 08	59,385,121
July 1,1904, to July 1,1905	21,977,576,875	32 079 27	60,212,539
July 1,1905, to July 1,1906	22,395,312,104	29.394 17	61,357,019

The following tables show in detail the work done by each engine each month of the year:

ENGINE No. 1.

MONTHS.	Time run.		Revolutions.	Gallons Pumped.
	H.	M.		
July	598	15	388,190	506,460,300
August	636	25	404,820	536,928,240
September	707	00	439,340	543,235,500
October	715	30	442,185	542,804,670
November	598	00	354,235	518,302,500
December	413	05	247,935	292,290,990
January	682	50	400,425	497,255,900
February	527	00	479,230	500,442,930
March	342	05	204,960	173,267.700
April	52	00	31,910	41,578.560
May	425	25	271,045	345,860,830
June	638	05	408,615	537,265,570
Total	6,335	40	4,072,890	5,035,713,630

ENGINE No. 2.

July	122	50	79,315	101,208,480
August	224	25	156,470	191,732,520
September	11	00	8,760	14,086,080
October	55	00	35,300	38,780,040
November	144	00	91,520	141,738,960
December	......	....	....	....
January	68	20	44.210	56,021,880
February	18	00	14,400	16,652,880
March	......	....	....	....
April	......	....	....	....
May	......	....	....	....
June	......	....	....	....
Total	643	35	429,975	560,220,840

ENGINE No. 3.

July	299	50	148,285	227,825,410
August	237	50	157,895	154,819,560
September	272	55	168,040	153,588,560
October	227	05	128,325	117,289,050
November	432	20	246,365	333,624,010
December	171	15	98,970	90,458,580
January	224	40	113,720	103,940,080
February	132	10	72,625	65,885,690
March	20	20	11,315	10,341,910
April	267	50	158,275	144,663,350
May	137	35	142,470	130,217,580
June	159	20	171,015	176,145,250
Total	2,503	10	1,617,300	1,708,799,030

ENGINE No. 4.

MONTHS.	Time run.		Revolutions.	Gallons Pumped.
	H.	M.		
July	742	55	679,625	538,767,880
August	649	10	590,855	463,821,175
September	720	00	667,840	524,254,400
October	744	00	657,160	515,870,600
November	195	50	161,990	127,162,150
December	481	15	401,145	314,898,825
January	718	00	627,250	492,391,250
February	386	15	337,940	265,282,900
March	744	00	657,645	516,251,325
April	720	00	599,830	470,866,550
May	364	30	318,910	249,344,350
June	476	05	429,035	336,792,475
Total	6,940	20	6,129,225	4,815,703,880

ENGINE No. 5.

July	164	45	137,530	134,504,340
August	744	00	647,555	633,895,590
September	421	35	367,715	359,625,270
October	383	15	301,340	294,710,520
November	311	30	250,983	245,461,374
December	616	10	517,120	505,743,360
January	271	25	214,380	209,663,640
February	647	20	548,435	536,369,430
March	744	00	653,820	639,435,960
April	711	30	579,490	566,741,220
May	744	00	634,100	620,149,800
June	526	05	459,680	449,567,040
Total	6,285	35	5,312,148	5,195,867,544

ENGINE No. 6.

July	579	15	479,755	465,768,900
August	...	..	.....	....
September	298	25	246,620	241,194,360
October	360	45	313,820	306,925,740
November	408	30	331,585	324,290,130
December	698	10	557,455	545,190,990
January	506	05	414,320	405,204,960
February	669	40	548,790	546,496,620
March	744	00	633,550	619,611,900
April	701	30	550,360	538,252,080
May	744	00	611,930	599,467,540
June	609	55	497,550	486,603,900
Total	6,320	15	5,185,735	5,079,007,120

TOTAL EXPENSE PUMPING WATER, 1905-1906

Fuel coal consumed	$29,394 17
Salaries	36,800 15
Repairs boiler and engine	674 85
Engine oil and grease	534 13
Waste and rags	136 62
Boiler and engine supplies	152 43
Packing and hose	335 48
General supplies, engine and boiler	247 85
Electric light fixtures and supplies	27 97
Ice	60 30
Paint, lead and glass	21 75
Printing and stationery	41 80
Horse expense	22 25
Kerosene and gasoline	12 00
Boiler inspection and insurance	258 00
Telephone	54 00
Freight charges	5 91
Feed and bedding, horse	57 62
Towel supply	55 45
Total	$68,892 73

The cost of fuel per million gallons pumped was $1.31, and per million gallons pumped 100 feet high was $1.05. The table shows that the amount of water pumped during the year was 22,395,312,104 gallons, making the daily average 61,357,019, which is an increase of $\frac{1}{10}$ of one per cent compared with the preceeding year.

The total expense during the year for pumping water, including maintainance, heating station, library and greenhouse, hoisting coal, etc., was $68,892.73, thus making the cost per million pumped, $3.07.

The station duty of coal consumed for all purposes for the year was 89,956,692 foot pounds.

The engines are in a fair working order excepting No. 2, which is receiving a new foundation under the main pillow block. I consider the proper thing to do under existing conditions would be to reduce the size of the high pressure cylinder of this engine.

The two new triple expansion 25 million gallon pumps have been accepted by the board and are giving satisfactory service.

All boilers are in good condition. The three vertical water tube boilers and stokers, which were recently installed are ready for test. One has been in operation about a month and has performed as well as was expected. The new boilers and the changes of the main steam piping, which will permit the carrying of equal steam pressure throughout, will simplify the operations of this station.

Respectfully submitted,

URIAH GOULD,
Chief Engineer.

REPORT OF THE SUPERINTENDENT OF CONSTRUCTION.

To the Honorable Board of Water Commissioners:

Gentlemen—I respectfully submit the report of work done by the Construction Department from June 30th, 1905 to June 30th, 1906.

Statement of the Work performed at the Pumping Station from July 1st, 1905, to July 1st, 1906.

10 foot Conduit, work thereon	$ 849 67
8-ft. Conduit, work thereon	22 81
6-ft. Conduit, work thereon	28 75
5-ft. Conduit, work thereon	67 79
Basin Inlet No. 3, work thereon	57 68
Strainer Well No. 3, work thereon	50 33
Junction Well No. 5, work thereon	501 42
Junction Well No. 6, work thereon	443 79
Tearing down and moving old boilers	489 44
Digging and building foundation for boilers	1,093 48
Building foundation for new stack	776 24
Removing stone foundation under engine No. 1	880 51
Removing 10-in. cylinder	94 17
Removing old 10-in. pipe and set new in grounds	52 15
Removing old 10-in. and 6-in. pipe in grounds	121 60
Cleaning large wells and gates at station	160 91
Laying 2-in. pipe in grounds	134 38
Hauling cinders and rubbish at grounds	101 00
Pumping water from wells and conduits at grounds	128 90
Labor at grounds	158 88
	$6,203 86

Distribution System.

Inside the city we laid 81,881 feet, including pipe laid in new district, (Delray and Woodmere), which became part of Detroit April 1, 1906; and prior to annexing this territory we laid 2,418 feet and 6,100 feet in Delray and Woodmere respectively, making a total of 90,399 feet laid. This amount is the total number of feet laid in Detroit from June 30th, 1905, to June 30th, 1906.

During the year we discontinued 14,155 feet, which leaves a net increase of 76,244 feet or $14\frac{2824}{5280}$ miles. Outside the city we laid 28,500 feet, which does not include any pipe laid during the past year in Delray or Woodmere prior to, or since annexation.

The net increase in the entire system is 104,744 feet or $19\frac{4424}{5280}$ miles.

The Board now owns 325,422 feet or $61\frac{3342}{5280}$ miles outside of city and inside 3,279,703 feet, $631\frac{828}{5280}$ miles making a total pipeage in the system of 3,605,125 feet or $682\frac{4165}{5280}$ miles of the different sizes as follows:

SIZE OF PIPE, INCHES.	MEASURED LENGTH IN FEET TO JUNE 30, '05.	LENGTH IN FEET LAID FROM JUNE 30, '05, TO JUNE 30, '06.	DISCONTINUED FEET FROM JUNE 30, '05. TO JUNE 30, 1906.	TOTAL LENGTH IN FEET TO JUNE 30, '06
45	103	....	....	103
42	83,187	....	....	83,187
36	7,611	....	....	7,611
30	54,558	....	....	54,558
24	84,840	....	....	84,840
20	393	....	....	393
18	87	....	....	87
16	55,909	30	....	55,939
12	54,993	3,606	....	58,599
10	182,481	22,191	300	204,372
8	391,283	12,673	385	403,571
6	1,644,267	74,404	4,281	1,714,390
4	873,730	5,995	8,922	870,803
3	62,346	....	267	62,079
2	4,593	....	....	4,593
	3,500,381	118,899	14,155	3,605,125

Size and Length in feet of Pipe in Delray, Woodmere and Springwells to June 30th 1905, now included in city pipeage.

Location	Size	1889	1892	1895	1896	1897	1898	1899	18 Mnths 1901	1902	1903	1904	1905	Discontinued Pipe	Total ft. and Size in each Village	Total in Each Village
Springwells	4		3,845						21						3,866	3,866
Delray	4			477	876		15,273	244	254	1,565	1,583	580			20,852	
"	6	2,015		2,364		196	27,448		1,304		1,000	1,129	1,379	(1901) 1,536	35,329	
"	8						9,955								9,955	
"	10						9,602	221				276			10,099	
"	12						6,230	228							6,458	82,693
Woodmere	4										34,564	4,274	215		39,053	
"	6									484	49,087	562	1,258		51,391	
"	8										9,980				9,980	
"	10										5,214				5,214	
"	12										7,578				7,578	
"	16										473				473	113,689
		2,015	3,845	2,841	876	196	68,508	693	1,579	2,049	109,479	6,821	2,852	1,536	Gd. Tot'l	200,248

Length in Feet of Pipe laid (outside) City to June 30th, 1906, (during the following years) not including Delray, Woodmere and Springwells which is now included in city pipeage.

LOCATION	Size	1891	1892	1893	1894	1895	1896	1897	1898	1899	18 Mo. 1901	1902	1903	1904	1905	1906	Discontinued Pipe	Total ft. & Sizes each Village.	Total feet in each Village.
Fairview	4					644									653	3,108		4,405	
"	6					1,023	1,746		4,216	6,108					3,448	13,806	(1905) 2,304	28,043	
"	8		738		6,658					340					12,015			19,751	52,199
St. Clair Heights	6			6,930		3,641									806			11,877	11,377
Leesville	8						3,009											3,009	3,009
Hamtramck	4		3,541										7,442	6,034	1,330			18,347	
"	6	3,135			8,376			141					25,853	333,03	3,280	1,100		75,722	
"	8												49,64	6,712				11,676	
"	10												2,394					2,394	108,139
Highland Park	4							7										7	
"	6						18,137	508						6,005	3,742	10,486		42,273	
"	8							41						778				1,054	
"	10						3,457	700										4,232	
"	12						4,200	15										4,215	
"	16						815											815	52,596
State Fair Line	8														9,392			9,392	9,392
LaSalle Gardens	4							2,330										2,330	
"	6							10.617			255							10,872	
"	8							261										261	13,463
River Rouge	4										7,031	651		3,340			(1904)	11,022	
"	6										19,595	25	1,395	2,375	11,782		1782	33,390	
"	8										7,410							7,410	51,822
Ecorse	4													2,044				2,044	
"	6													11,671				11,671	
"	8													9,170				9,710	23,425
Total each year		3,135	4.279	6,930	15,034	5,308	31,364	14,620	4,216	10,687	34,291	676	42,048	81,972	16,448	28,500	4,086	Gd. Total	325,422

SHUT OFF GATES IN SYSTEM JUNE 30TH, 1906.

SIZE.	42-IN.	36-IN.	30-IN.	24-IN.	20-IN.	18-IN.	16-IN.	12-IN.	10-IN.	8-IN.	6-IN.	4-IN.	3-IN.	TOTAL.
Murdock	5	...	11	16	...	...	27	47	187	452	1,616	1,281	11	3,653
Flowers	20	...	9	18	...	...	...	...	39	51	245	434	20	836
Galvin	...	1	7	12	...	...	21	...	13	31	170	247	1	503
Michigan Brass and Iron Works	10	...	9	2	11	...	13	12	68	153	776	106	...	1,160
Pittsburgh	...	...	...	15	...	2	1	1	10	12	31	119	...	191
Roe Stephens (Scott)	...	...	...	...	...	...	...	6	1	6	42	....	...	55
Eddy	...	...	...	...	...	...	...	...	15	3	6	8	...	32
Scowden	...	...	...	...	...	...	...	...	7	18	48	12	...	85
Ludlow	...	...	...	...	...	...	...	...	1	2	9	5	...	17
St. Louis	...	...	...	...	...	...	...	3	98	....	....	....	...	101
Detroit Water Works	13	3	3	4	...	...	5	27	....	179	811	287	...	1,332
Prong	...	...	...	...	..	...	...	...	....	....	1	....	...	1
Boston	...	...	...	...	...	...	...	...	....	1	1	....	...	2
Newport	...	...	...	...	...	...	...	...	....	....	....	1	...	1
Name Unknown	...	...	...	...	...	...	...	...	....	3	9	32	1	45
TOTAL	48	4	39	67	11	2	67	96	439	911	3,765	2,532	33	8,014

GATES SET FOR SHUT-OFFS FROM JUNE 30, 1905, TO JUNE 30, 1906.

NAME.	SIZES.					
	4-in.	6-in.	8-in.	10-in.	12-in.	TOTAL.
Detroit Water Works—City	27	127	34	44	7	239
Murdock—City	....	4	....	....	....	4
Mich. Brass and Iron Works—City	....	5	....	5	....	10
Flowers—City	....	1	....	....	....	1
Detroit Water Works—Delray	....	2	....	....	....	2
Detroit Water Works—Woodmere	2	7	....	....	....	9
Detroit Water Works-Highland Park	...	9	....	....	....	9
Detroit Water Works—Hamtramck	....	4	....	....	....	4
Detroit Water Works—Fairview	1	6	....	....	....	7
Total	30	165	34	49	7	285

SHUT-OFF GATES DISCONTINUED FROM JUNE 30, 1905, TO JUNE 30, 1906.

NAME.	SIZES				
	4-in.	6-in.	8-in.	10 in.	TOTAL.
Detroit Water Works	5	14	......	1	20
Mich. Brass and Iron Works	4	5	......	......	9
Murdock	22	10	3	......	35
Flowers	3	1	......	......	4
Eddy	1	......	......	......	1
Scott	.....	1	......	......	1
Total	35	31	3	1	70

TOTAL AND AVERAGE COST OF WELLS BUILT OVER GATES

OVER OLD LINES.		Average.
1 gate well, 3"	$ 23.82	$
91 gate wells, 4", 6" and 8"	1,991 08	21 88
5 gate wells, 10",	111 73	22 82
97	$2,126 13	

WELLS OVER NEW LINES.
(Cost included in pipe lines.)

203 gate wells, 4", 6" and 8"	
49 gate wells, 10" and 12"	
252	

The following is a statement of examinations, operations and repairs of gates, etc.

6,589 gates examined.
439 shut-offs for pipe lines and repairs.
149 tees set for fire department.
3,910 wells in system.

MISCELLANEOUS WORK.

KIND OF WORK	No.	COST OF LABOR	COST OF MATERIAL	COST OF CARTAGE	TOTAL COST
Leaks in Mains......	107	$ 827 86	$ 180 36	$ 216 21	$ 1,224 43
Leaks in service connections..........	408	1,434 95	47 13	280 90	1,762 98
Service cocks inserted	1027-1″ 2802-⅝″	1,886 08	1,877 31	523 94	4,287 33
Smith Sleeves and Valves set........	95	557 11	1,773 00	83 25	2,413 36
Service connections discontinued......	150	218 65	30 07	50 67	299 39
Gates set on old lines	....	202 40	346 81	34 88	584 09
Check, Relief Valves and Air Chambers examined.........	....	66 65	68 91	12 13	147 69
Connecting Blow-offs to Sewers.........	....	350 50	301 82	27 02	679 34
Ditches and Pavements repaired....	......	94 20	....	13 27	107 47
Gates examined and repaired..........	....	1,504 62	449 49	120 56	2,074 67
Flushing Mains—bad water............	....	2,378 05	71 94	156 14	2,606 13
Flushing Dead Ends —bad water......	7,372	2,541 64	....	83 68	2,625 32
Draining, cleaning and repairing wells	....	864 23	75 31	44 53	984 07
Gate Wells repaired and set to grade...	....	483 83	263 89	80 13	827 85
Gate Boxes repaired and set to grade...	....	138 28	33 25	35 93	207 46
Hyds. set, examined and repaired......	....	186 97	594 24	21 88	803 09
Private Connections (Mains)...........	....	24 93	51 63	3 39	79 95
Private Gate Wells built.............	....	20 67	10 80	39 34	70 81
Meters set and removed............	....	87 31	23 99	13 94	125 24
Mains located, lowered and examined	....	247 02	97 75	16 89	361 66
Letting on, shutting off and locating service connections...	....	137 75	....	35 25	173 00
Short supply on service connections...	....	100 92	25	16 54	117 71
Miscellaneous cartage	....	219 36	....	175 02	394 38
Total.........	....	$14,573 98	$ 6,297 95	$ 2,085 49	$22,957 42

PIPE LAID FROM JULY 1st, 1905, TO JULY 1st, 1906.

Date.	LOCATION OF PIPE.	Feet.	Size.	COST OF CONSTRUCTION.											
				Pipe.	Specials.	Lead.	Gates.		Sundries.	Gate-well.	Hauling.	Repaving.	Sup. & Eng.	Labor.	Total Cost
							No.	Cost.							
July 12,1905	Agnes, from 19 ft. w of e of Seminole to 3 ft. w of e of Alley e of Parker	251	6 in.	$95 49	$4 46	$9 50	....	$14 50	$1 13	$19 50	$3 45	.....	$12 55	$92 50	$253 06
July 3 1905	Alexandrine, from 18 ft. w of e of Greenwood to 31 ft. e of w of Fourth	543	6 in.	206 59	6 88	23 75	....	14 50	60 14	19 17	15 53	.....	27 15	460 88	834 59
Sept.6, 1905	Amsterdam, from 29 ft. e of w of Woodward to 80 ft. w of e of Second..........................	1,059	10 in.	717 62	51 98	71 25	....	139 00	54 46	55 88	34 86	409 34	52 95	1,062 00	2,649 34
Oct. 11, 1905	Allandale from 4 ft. e of w of Grand River to 797 ft. w of same	801	6 in.	305 11	1 62	23 75	....	14 50	1 44	19 50	6 80	.....	40 05	223 25	636 02
Oct. 30, 1905	Annar, from 14 ft. e of w of Knox to 213 ft. w of w of same..........	227	6 in.	85 92	4 84	11 50	....	26 00	5 23	18 62	4 01	.....	11 35	48 71	216 18
Nov.18,1905	Atwater, from 30 ft. w of e of Woodward to 154 ft. e of e of Hastings with connections	2,700 46 26 6	10 in 8 in 6 in 4 in	1,871 80	114 50	207 00	....	217 50	169 63	177 14	87 32	930 55	138 90	3,073 63	6,987 97
Nov. 2, 1905	Atwater, from 1 ft. w of w of Orleans to 154 ft. e of e of Hastings, and in Riopelle and Rivard with connections	2,020 38	10 in 8 in	1,385 89	137 04	161 00	....	187 00	89 34	and repairs 148 21	80 50	558 67	102 90	2,687 56	5,538 11
Dec. 26,1905	Alger, from 118 ft. ft. e of e of Brush to 252 ft. e of same................	134	6 in.	51 17	....	4 60	.. .	....	23	....	4 50	.....	6 70	24 75	101 95
Apr.24, 1906	Alger, from 4 ft. e of e of Oakland to 199 ft. e of e of same............	207	6 in.	94 67	5 54	8 09	....	....	1 09	....	8 20	.....	10 35	44 91	172 85
Apr.24, 1906	Atkinson, from 201 ft. w of w of Third to 284 ft. w of w of same....	83	6 in.	38 70	....	3 47	....	....	27	....	2 29	.....	4 15	17 22	66 10
Apr.23, 1906	Artillery and Avery crossing Artillery.................	30 24	16 in 6 in	66 08	48 50	32 34	....	....	2 34	reb'lt 2 21 18	11 15	.....	2 70	141 39	325 76
June 9, 1906	Atkinson from 56 ft. w of e of Hamilton Boulevard 517 ft. e of e of same	573	6 in.	265 88	5 72	23 10	....	13 75	2 63	20 12	6 39	.....	28 65	194 86	561 94
July 17, 1905	Brush, from 32 ft. n of s of Sidney to 6 ft. n. of s of Philadelphia ..	307	8 in.	161 21	4 60	19 00	....	21 00	3 71	20 57	9 38	.....	15 35	127 25	382 07
Aug. 14,1905	Belvidere, from 672 ft. s of s of Medbury to 293 ft. s o. s of Chapin....	625	6 in.	235 29	2 98	23 75	....	14 50	3 91	19 81	6 70	.....	31 25	195 02	536 21
Aug.12,1905	Belvidere, from 397 ft. n of n of Jefferson to 22½ ft. n of s of Sears...	325	6 in.	123 73	6 20	11 88	....	....	1 68	....	6 52	.....	16 25	120 90	287 16

Aug 31, 1905	Beecher, from 8½ ft. s of n of Standish to 9 ft. n of s of Hyacinthe...	1,488 18 37	10 in 8 in 6 in	951 20	46 82	85 50	....	93 50	8 55	89 09	26 52	.....	74 40	1,102 05	2,477 63
Oct. 9, 1905	Buhl, from 22 ft. e of w of McClellan to 303 ft. e of e of same.......	351	6 in.	183 47	1 30	14 25	....	26 00	5 51	20 37	8 97	.....	17 55	78 59	306 01
Dec. 12 1905	Belvidere, from 296 ft. s of s line of Sylvester to 691 ft. n of n line of same...............	1,047	6 in.	397 73	8 94	38 00	....	14 50	2 96	20 04	11 84	.....	52 85	226 61	772 97
Oct. 17, 1905	Beaubien, from 23½ ft. n of s of Harper to 2 ft. n of s of Boulevard	1,933	10 in.	1,330 76	67 66	152 00	....	159 50	82 13	145 83	79 50	286 06	97 65	2,293 75	4,694 84
Oct. 28, 1905	Boulevard east, from n line of Gratiol to 14 ft. n of s of Farnsworth.	677	6 in.	255 86	13 80	29 90	....	14 50	4 73	68 12	8 89	.....	33 85	253 41	683 06
Dec. 20, 1905	Boulevard west, from s line of Buchanan to 315 ft. s of same........	315	6 in.	120 28	8 76	13 80	....	11 50	5 69	....	9 77	.....	15 75	91 25	276 80
Mar. 23, 1906	Buhl, from 300 ft. e of e of McClellan to 18 ft. e of e of Cooper.........	113	6 in.	52 23	3 33	4 62	....	....	33	.... ..	6 11	.....	5 65	27 41	98 68
Mar. 29, 1906	Boulevard north, from 26 ft. w of e of Dubois to 3 ft. e of e of same...	29	6 in.	12 58	4 12	2 48	....	13 95	35	19 83	39	.....	1 41	7 84	62 99
Apr. 27, 1906	Boulevard north, from 37 ft. e of w of Stanton to 148 ft. w. of w of same..............................	185	6 in.	86 27	2 41	9 24	....	24 90	5 27	22 40	1 75	.....	9 25	58 40	219 89
May 10, 1906	Boulevard north from 37 ft. w of e of Second to 120 ft. e of same.	157	6 in	73 96	10 01	9 24	....	24 90	3 64	21 10	6 77	....	7 85	97 43	254 90
Sep. 16, 1906	Boulevard north 30 ft. e of w of J. Campau to 395 ft. w of w of same.	425	6 in.	162 29	2 10	19 00	....	26 00	5 17	19 34	5 40	.....	21 25	153 74	414 29
June 9, 1906	Bitburg, from 21 ft. w of e of Livernois to 10 ft. w of e Martin.......	1,663	8 in	1,066 13	37 89	115 50	...	38 85	10 66	42 02	23 60	.....	88 15	501 56	1,919 36
June 15, 1906	Bedford Court, from 20 ft. e of w of Artillery to 291 ft. w of w of same.	311	6 in.	144 10	7 38	13 86	....	24 90	4 77	20 85	5 22	.....	15 55	92 75	328 88
June 14, 1906	Brandon from 6 ft. e of e of Scotten to 6 ft. w of w of same..	78	6 in.	34 97	19 67	13 86	....	27 90	3 75	40 70	3 94	.....	3 90	48 25	196 94
June 9, 1906	Belvidere from 380 ft. n of n line of Goethe to 788 ft. s of s line of same	1,227	6 in	571 30	9 88	50 82		13 95	1 43	21 33	15 70	.....	61 35	295 25	1,041 01
July 15, 1905	Belmont from e line of Woodward e Clay from 19 ft. e of St. Aubin to 435 w of w of Dequindre st. ..	475	6 in.	181 38	5 20	23 75	....	11 50	1 32	19 66	7 12	.....	23 75	146 13	419 81
Aug. 15, 1905		1,342	10 in	908 71	64 80	104 50	....	174 00	9 39	161 73	40 63	.....	67 10	813 25	2,344 11
Aug 22, 1905	Colburn from 43 ft. w of e 3rd to 2 ft. e of w of Second.	619	6 in.	235 61	9 48	23 75	....	14 50	4 93	19 66	6 75	7 33	30 95	193 25	546 20
Sep. 9, 1905	Cass ave from 19 ft. n of s of Amsterdam to old pipe n of same.....	312	8 in.	161 80	12 24	9 50	.. .	49 00	6 99	repairs 11 73	12 48	62 64	15 69	208 25	550 53
Sep. 16, 1905	Carrie from 13 ft. s of n of Harper to 365 ft. n of n of same..........	378	6 in.	142 06	2 04	14 25	....	26 00	6 36	19 81	4 65	.....	18 90	85 56	319 63
Sep. 13, 1905	Commonwealth from 167 ft. n of n of Calumet to 14 ft. n of n Forest, also from 18 ft. s of Forest to 1 ft. 6 in. n of s of Hancock...........	825 888	6 in 6 in	457 49	26 06	47 50	....	43 50	6 11	60 57	11 60	....	60 55	479 62	1,198 12

PIPE LAID FROM JULY 1st, 1905 TO JULY 1st, 1906.—CONTINUED.

Date.	LOCATION OF PIPE.	Feet.	Size.	COST OF CONSTRUCTION.											
				Pipe.	Specials.	Lead.	Gates.		Sundries.	Gate-wells.	Hauling.	Re-paving.	Sup. & Eng.	Labor.	Total Cost.
							No.	Cost.							
Sept. 21, 1905	Campbell from 331 ft. n of n of Herbert n	198	6 in	$ 75 61	$.....	$7 13	....	$.....	$ 28	$......	$3 58	.....	$9 90	$51 38	$147 88
Oct. 31, 1905	Cavalry from 27 ft. n of s of Reeder to 8 ft. n of n of same	41	6 in.	15 65	3 24	2 50	....	11 50	3 02	....	2 08	.....	2 05	12 42	52 46
Nov. 13, 1905	Cooper from 30 ft, n of n of Gratiot to 2 ft. n of n of Shoemaker	969	6 in.	368 50	8 98	32 20	....	26 00	10 67	20 46	16 28	.....	43 45	276 49	803 03
Nov. 22, 1905	Canton from 208 ft, n of Lambert to 659 ft. n of same	451	6 in.	177 22	....	13 80	....	....	1 97	....	5 60	.....	22 55	162 39	383 53
Nov. 25, 1905	Crane ave. from end of pipe n of Gratiot to 549 ft. n of n of same	294	6 in.	112 29	....	10 35	....	....	87	....	4 17	.....	14 70	61 46	203 84
Nov. 20, 1905	Canton from end of pipe n of Kercheval to 288 ft. n of same	98	6 in.	37 42	....	1 15	....	....	40	....	4 14	.....	4 90	20 82	68 83
Nov. 24, 1905	Cadillac from 93 ft. s of s of Harper to 715 ft. s of same	622	8 in.	327 82	9 68	32 20	....	....	1 84	....	17 65	.....	31 10	240 00	660 29
Dec. 20, 1905	Cadillac from 28 ft. n of s of Moffatt to 13 ft. n of s of Chapin	1,105	12 in.	1,034 00	15 80	87 40	....	49 25	5 14	20 81	27 81	.....	55 25	448 90	1,744 36
April 7, 1906	Canton from 25 ft. s of n of Kirby to 108 n of same	133	6 in.	62 02	2 41	4 62	....	10 95	4 72	....	10 26	.....	6 65	43 57	145 20
Apr. 21, 1906	Canton from 288 n of n of Kercheval to 470 ft. n of n of same	182	6 in.	84 88	....	6 93	....	....	56	....	6 44	.....	9 10	42 51	150 42
May 12, 1906	Canton from 108 ft. n of n of Kirby to 75 ft. n of n of Ferry	391	6 in.	180 48	7 90	18 48	....	13 95	1 54	22 34	4 14	.....	19 55	93 46	361 84
May 23, 1906	Canton from 14 ft. s of n of Harper to 316 ft. s of s of same	368	6 in.	170 69	7 65	13 86	....	13 95	1 38	20 89	5 48	.....	18 40	99 27	351 47
May 29, 1906	Cadillac from 709 ft. s of s of Harper to n line of Shoemaker	763	8 in.	492 71	....	41 58	....	..... .	2 87	......	15 40	.....	38 15	207 77	798 48
June 4, 1906	Chope from 9 ft. s of Moore to 39 ft. s of n of Brown, also in Brown from 23 ft. e of w of Chope to 88 ft. w of w line, also in Moore from e of Chope to w line of same	367 111 66	6 in 6 in 8 in	265 54	15 19	27 06	....	13 95	1 69	20 77	4 90	.....	27 20	241 75	621 05
May 21, 1906	Chope from 36 ft. n of s of Grand River to n line of Scovel	206	6 in.	96 07	4 52	9 24	...	13 95	1 99	21 00	2 70	.....	10 30	134 75	294 52
June 26, 1906	Crane from 176 ft. s of s of Lambert to 190 ft. n of n of same	426	6 in.	197 74	4 16	18 48	....	13 95	1 26	21 00	3 50	.....	21 30	124 00	405 39
Aug. 18, 1905	Durand from 232 ft. e of e of Van Dyke to 348 ft. e of e of same	116	6 in.	44 30	2 98	9 50	....	....	40	....	5 83	.....	5 85	31 65	100 51

Sept. 9, 1905	Dubois from n line of Farnsworth to 189 ft. n of n of Frederick and also in Frederick from 5 ft. w of w of Dubois to 5 ft. e of e of same	506 58	8 in. 6 in.	$265 96 22 15	$1300	$35 63	....	$29 00	$15 33	and rep. $46 77	$6 42	.....	$98 90	$347 70	$ 810 16
Apr. 2, 1906	Dubois from 6 ft. s of n of n Boulevard to 23 ft. n of s of Newton.	735	8 in.	468 81	23 99	26 13	....	19 95	5 07	20 29	9 83	.....	36 75	193 91	804 73
Apr. 26, 1906	Durand from 348 ft. e of e Van Dyke to 411 ft. e of e of same	63	6 in.	29 37	....	2 31	...	....	21	....	1 76	.....	3 16	13 34	50 14
May 15, 1906	Devereaux from 26 ft. w of e of 30th to 44 ft. e of w of 28th.....	421	6 in.	195 88	....	18 48	....	13 95	1 73	22 24	6 86	.....	21 05	121 28	401 47
May 25, 1906	Duncan from 39 ft. w of e of Maxwell to 29 ft. e of w of Stephens	303	6 in.	141 30	....	11 55	...	13 95	1 45	20 28	6 06	.....	15 15	74 27	284 01
July 14, 1906	Ellery from 33 ft. s of n of Harper to 151 ft. n of n of same...........	184	6 in.	69 88	7 16	9 50	....	26 40	4 00	19 34	4 48	.....	9 20	76 34	225 90
June 1, 1906	Eastern place from 24 ft. e of w of Chope to 7 ft. w of same..........	34	6 in.	15 85	....	2 31	....	13 95	64	20 77	25	.....	1 70	7 15	62 62
Sept. 15, 1905	Ferry from 30 ft. e of w of Cass to 42 ft. w of e of 3rd	1310	6 in.	498 54	11 70	47 50	....	43 50	9 38	61 58	20 18	4 12	65 50	571 60	1,333 60
Sept. 28, 1906	Fifteenth from n line of Grand River to 8 ft. n of s of Warren.....	332	6 in.	126 02	2 06	9 50	....	....	37	14 76	5 90	.....	16 60	115 25	290 46
Nov. 1, 1905	Fordyce from 20 ft. s of n of Vulcan to 270 ft. n of n of same...........	290	6 in.	110 56	2 12	11 50	....	26 00	6 99	18 43	2 64	....	14 50	74 81	267 55
Oct. 12, 1905	Farrar from 30 ft. n of s of Monroe to 10 ft. n of s of alley n of Monroe	201	6 in.	83 17	13 54	10 67	....	28 63	14 05	22 58	12 46	55.94	10 05	224 33	475 42
Apr. 16, 1906	Frederick from 1 ft. e of w of Mt. Elliot to 328 w of w of same	329	6 in.	153 43	2 41	13 86	....	10 95	5 45	....	6 14	.....	16 45	79 58	288 27
May 31, 1906	Field from 27 ft. w of e of Livernois to 102 ft. w of w of Alice..........	1466	8 in.	940 21	30 20	101 64	....	50 85	14 21	43 37	24 11	.....	73 30	383 68	1661 57
June 13, 1906	Frontenac Boulevard from 453 ft. n of n of Kercheval to 509 ft. n of n of same.	56	6 in.	26 12	....	3 30	....	....	17	....	1 88	.....	2 80	14 76	49 03
June 27, 1906	Fisher from 12 ft. s of n of Gratiot to 85 ft. s of s of Lambert	867	6 in.	403 41	8 12	32 34	....	24 90	5 65	21 00	13 51	.....	43 35	274 33	826 61
July 11, 1906	Fourth ave. from 38 ft. n of s of Fort, north.....................	344 25	8 in. 6 in.	186 97	21 78	28 50	....	47 50	2 18	37 66	13 43	47 66	18 85	414 93	819 46
Oct. 6, 1905	Grand River from 270 ft. n of n of North Boulevard to 235 ft. s of n of Allandale........................	943	6 in.	358 58	11 00	33 25	....	29 00	3 44	39 81	8 04	.....	47 15	31 67 254 75	91 24 785 02
Apr. 16, 1906	Goethe from 224 ft. e of e of McClellan to 420 ft. e of e of same	196	4 in.	54 85	10 84	4 68	....	....	44	....	2 61	.....	9 80	36 59	108 97
Aug. 10, 1905	Hurlbut from 560 ft. n of n of Mack to 872 ft. n of n of same....... ...	317	6 in.	120 67	....	19 00	....	14 50	2 80	19 19	4 82	.....	15 85	100 65	308 32
Aug. 19, 1905	Helen from 206 ft. n of n of Harper to 267 n of n of same.............	61	6 in.	23 29	....	2 38	...	....	16	....	4 13	... .	3 05	20 25	53 26
Sept. 15, 1905	Hyacinthe west from Beecher street....	103	10 in.	70 81	41 24	4 75	....	29 00	4 85	21 40	4 00	.....	17 30	448 88	642 23

PIPE LAID FROM JULY 1st, 1905, TO JULY 1st, 1906—CONTINUED.

Date.	LOCATION OF PIPE.	Feet.	Size.	COST OF CONSTRUCTION.											
				Pipe.	Spe-cials.	Lead.	Gates.		Sun-dries.	Gate-wells.	Haul-ing.	Re-pav-ing.	Sup. & Eng.	Labor.	Total Cost.
							No.	Cost.							
Sept.17,1905	Hancock from 28 ft. e of w of Woodward to 26 ft. w of e of Second	1,364	10 in.	$929 33	$60 24	$ 97 38	...	$130 50	$ 8 75	$104 51	$ 54 56	$20 48	$68 20	$982 07	$2,455 97
Nov. 2, 1905	Hammond from 32 ft. s of s line of Stark to 275 ft. s of s of same	243	6 in.	92 79	....	9 20	....	....	1 00	....	7 40	.....	12 15	51 26	173 80
Aprl 13,1906	Helen from 20 ft. n of s of Strong to 263 ft. s of s of same	283	6 in.	131 04	7 29	9 24	....	18 95	1 18	19 82	5 06	.....	14 50	60 15	262 23
May 9, 1906	Helen from 333 ft. n of n line of Kercheval to 448 ft. n of n of line same	115	6 in.	53 68	....	4 62	....	....	50	....	5 52	.....	5 75	32 51	102 53
June12,1906	Humboldt from 19 ft. n of s of Michigan to 4 ft. n of n of same	51	8 in.	32 76	7 67	4 62	....	19 95	2 60	21 33	12 22	.....	2 55	103 00	206 70
June 8, 1906	Holcomb from 689 ft. s of s line of Medbury to 696 ft. s of s line of same	57	6 in.	26 58	....	2 31	....	....	17	....	3 39	.....	2 85	11 28	46 58
June15,1906	Hamilton Boulevard from 101 ft. s of s of Atkinson to 15 ft. s of s line of same	153	10 in.	130 01	5 11	9 24	....	27 95	53	20 72	4 88	.....	7 65	51 06	257 15
June25,1906	Holcomb from 17 ft. s of n of Louis to 15 ft. n of s of Dumontier	320	6 in.	149 24	....	13 86	....	13 95	1 09	22 87	7 07	.....	16 00	70 08	294 16
Oct. 13, 1905	Jefferson from 11 ft. 6 in. e of w of St. Aubin to 18 ft. 6 in. w of e of Dubois	492	10 in.	338 19	21 30	36 80	....	29 00	7 73	44 43	17 44	.....	24 60	384 42	903 91
July 28, 1905	Kercheval from 5 ft. e of w of Seminole to 21 ft. w of e of same	54	8 in.	28 55	4 46	5 00	....	....	80	....	2 07	.....	2 70	39 60	83 18
Aug 25,1905	Kirby from 123 feet w of w of Grand River to 46 ft. e of w of same	169	6 in.	63 39	6 80	14 25	....	14 50	2 54	20 52	4 23	5 83	8 45	77 37	217 88
Sep. 14, 1905	Kirby from west line of Collins	308	6 in.	115 90	4 50	14 25	....	....	61	19 81	5 00	4 62	15 40	102 08	282 17
Oct. 21, 1905	Kirby from 148 ft. e of w of McDougall to 28 ft. e of w of same and also same in McDougall from 19 ft. n of s of Kirby to 18 ft. s of s of same	195 32	6 in 6 in	86 68	6 26	9 20	....	14 50	4 30	19 99	2 43	.....	11 35	152 35	307 06
Nov. 3, 1905	Kanter from 3 ft. e of e of McDougall Boulevard to 207 ft. e of e of same	204	6 in.	77 14	94	9 20	....	....	1 67	19 50	5 42	.....	10 20	72 36	196 43
May 3, 1906	Kirby from 19 ft. e of w of St. Aubin to 623 ft. w of w of same	642	8 in.	411 99	13 14	50 82	....	19 95	4 35	rebuilt 11 89	10 04	.....	32 10	281 94	836 22

May 16, 1906	Kirby from 30 ft. w of e of Vermont to 59 ft. w of same	99	8 in.	$66 08	$12 18	$9 24	....	$10 95	$6 86	....	$2 33	.....	$4 95	$92 50	$205 90
Aug. 25, 1905	Lawton from 84 ft. s of s of Hudson to 22 ft. n of s of Kirby............	295	6 in.	112 27	4 80	14 25	....	....	82	... .	5 90	14 01	14 75	97 84	264 64
Sept. 30, 1905	Lockwood from 16 ft. 8 in. n of s of Otis to 24 ft. n of s of Norton.....	313	6 in.	117 23	....	14 25	..	14 50	58	$19 81	6 26	.....	15 65	89 97	278 25
Oct. 12, 1905	Lockwood from 105 ft. s of s of Norton to 220 ft. s of same........	115	6 in.	43 35	1 04	4 75	....	....	49	....	2 30	.....	5 75	36 00	93 68
Nov. 11, 1905	Lambert from e line of Mt. Elliot to 212 ft. e of e of same.............	212	6 in.	80 96	1 10	9 20	...	14 50	1 24	19 34	4 38	....	10 60	71 18	212 50
Nov. 29, 1905	Ludden from 23 ft. w of e of Elmwood to 1 ft. e of n of alley w of same	170	6 in.	64 91	12 00	11 50	....	14 50	4 30	19 44	9 49	.....	8 50	104 86	249 50
Dec. 19, 1905	Lockwood from 61 ft. n of n of Rollin to 24 ft. s of n of same, also in Rollin from 16 ft. e of w of Lockwood to 249 ft. w of same	85 265	6 in. 6 in.	133 65	3 22	13 80	....	14 50	2 69	12 86	12 86	.....	17 50	111 50	329 49
May 7, 1906	Lincoln from 22 ft. w of e of Lawndale to 526 ft. e of same...........	548	6 in.	255 57	....	23 10	....	13 95	1 89	20 62	11 26	.....	27 40	147 63	501 42
June 4, 1906	Ladue from 42 ft. e of w of Van Dyke to 187 ft. w of same.........	228	6 in.	106 33	4 45	9 24	....	24 90	5 15	21 00	11 89	.....	11 40	69 00	263 36
June 6, 1906	Livernois from 20 ft. s of n of Alice to 20 ft. s of n of Bitburg..........	333	10 in.	276 18	12 51	27 72	....	27 95	4 26	21 74	6 00	.....	16 65	132 02	525 03
June 8, 1906	Laura from 17 ft. e of w of McClellan to 26 ft. e of e of Pennsylvania	715	6 in.	332 52	3 56	25 41	....	27 90	2 73	41 27	9 96	.....	35 75	159 95	639 05
Aug. 18, 1905	Milwaukee from 25 ft. e of w of Lawton to 328 ft w of same	353	6 in.	134 03	5 84	14 25	....	14 50	5 69	19 50	7 06	.....	17 65	99 55	318 07
Aug. 21, 1905	Milwaukee from 25 ft. e of w of 12th to 439 ft. w of w of same..........	464	6 in.	176 43	6 84	19 00	....	26 00	5 37	19 72	12 97	.....	23 20	161 75	450 78
Sep. 9, 1905	Milwaukee from 16 ft. w of e of Hastings to 22 ft. e of w of St. Aubin, also 35 ft. of 8 in. Riopelle	3,154 35	10 in. 8 in.	2,167 29	79 38	228 00	....	276 00	412 97	and repairs 143 27	138 90	642 68	159 45	4,247 21	8,490 15
Sep. 6, 1905	Meldrum from 137 ft. s of s of Waterloo to 28 ft. n of s of same......	165	6 in.	63 01	5 12	7 15	....	14 50	2 16	19 71	4 06	.....	8 25	51 14	175 10
Sep. 26, 1905	Medbury from 172 ft. e of e of Mt. Elliot to w line of Beaufait	528	6 in.	200 87	84	19 00	....	....	88	....	6 18	....	26 40	131 02	385 19
Oct. 17, 1905	McClellan from 4 ft. s of n of Medbury to 29 ft. 6 in. s of s of Lamb St.................................	181	6 in.	67 21	7 78	9 50	....	11 50	3 36	....	4 64	.....	9 05	42 42	155 46
c . 7, 1905	Meldrum from 40 ft. s of n of Fraser e to 209 ft. n of n of same..........	249	6 in.	94 71	....	9 50	....	26 00	5 91	18 42	4 58	.....	12 45	53 34	224 91
Nov. 6, 1905	Maxwell from 5 ft. s of n of Mack to 341 ft. n of n of same...........	346	6 in.	130 98	3 88	18 80	....	29 00	6 22	18 91	6 28	.....	17 30	92 75	319 12
Nov. 20, 1905	McGregor from 24 ft. 6 in. w of e of Junction to 385 ft. e of e of same	409	6 in.	156 18	5 31	11 50	....	26 00	2 43	19 66	7 23	5 86	20 45	97 97	352 59
Dec. 4, 1905	Maxwell from 21 ft. s of n of Waterloo to 333 ft. s of s of same.....	372	6 in.	142 05	2 86	11 50	....	11 50	5 68	....	6 71	.....	18 60	79 15	278 00

PIPE LAID FROM JULY 1, 1905, TO JULY 1, 1906—CONTINUED.

Date	LOCATION OF PIPE	Feet	Size	COST OF CONSTRUCTION											
				Pipe	Specials	Lead	Gates		Sundries	Gate-welll	Hauling	Re-paving	Sup. & Eng.	Labor	Total Cost
							No.	Cost							
Dec. 18, 1905	Maxwell from 39 ft. s of s of Palmer to end of pipe n of Gratiot	300	6 in.	$114 56	$......	$11 50	....	$......	$ 70	$......	$ 6 28	.....	$15 00	$ 80 00	$ 228 04
May 8, 1906	McGregor Place from 385 ft. e of e of Junction to 568 ft. e of same	183	6 in.	85 34	1 06	9 24	....	....	33	....	6 74	.....	9 15	49 00	160 86
May 12, 1906	Missouri from 40 ft. n of s of McGraw to 182 ft. s of same	222	6 in.	104 47	8 44	13 86	..	24 90	5 07	21 33	5 41	.....	11 10	85 75	280 33
May 25, 1906	Maxwell from 5 ft. s of s of Duncan to 21 ft. n of s of same	26	6 in.	11 65	4 57	2 31	....	....	21	....	1 69	.....	1 30	5 47	27 20
June 2, 1906	Milwaukee from 35 ft. e of w of Sterling to 36 ft. w of w of same	71	6 in.	31 71	4 93	4 62	....	24 90	5 40	19 59	7 26	.....	3 55	17 34	119 30
July 20, 1905	Newton from 37 ft. w of e of St. Aubin to 257 feet e of e of same	294	6 in.	112 65	10 15	14 25	....	26 00	4 86	19 34	3 79	.....	14 70	99 63	305 37
April 3, 1906	Newton from 25 ft. e of w of Dubois to 207 ft. w of w of same	232	6 in.	107 73	....	6 88	....	13 95	77	19 28	3 10	.....	11 60	58 47	221 78
April 5, 1906	Newton from 26 ft. w of e of Dubois to 176 ft. e of e of same	202	6 in.	93 73	....	5 78	....	13 95	1 10	19 82	2 70	.....	10 10	47 01	194 19
Aug. 8, 1906	Oakland from 26 ft. s of n of Philadelphia to 17 ft. s of s of King and connections	977 25 26 74	10 in. 6 in. 6 in. 6 in.	715 77	21 50	78 38	....	87 00	11 42	100 19	15 16	....	55 10	885 99	1,969 91
Sept. 5, 1906	Orleans from 26 ft. s of n of Milwaukee to 21 ft. 6 in. n of s of Trombley	541	8 in.	284 97	19 84	38 00	....	42 00	3 19	60 69	12 50	.....	27 05	243 00	781 24
Oct. 4, 1906	Oakland from 41 ft. n of s of Bethune to 24 ft. n of s of Horton	532	10 in.	361 56	27 86	38 00	...	29 00	35 81	22 37	15 88	101 22	26 60	541 26	1,199 56
Dec. 4, 1905	Osborn from 17 ft. e of w of Hastings to 362 ft. e of e of same	390	6 in.	150 38	5 10	18 40	....	14 50	3 71	19 88	3 00	....	19 70	155 00	389 67
Apr. 30, 1906	Owen from 186 ft. w of w of Oakland to 696 ft. w of same	510	6 in.	237 85	....	18 48	...	....	2 43	....	11 94	.....	25 50	109 66	405 86
June 4, 1906	Otis from 339 ft. e of e of Wesson to 390 ft. e of e of same	51	6 in.	23 79	.. ..	2 75	....	....	08	....	4 13	.....	2 55	19 84	53 14
July 12, 1905	Parker, alley e of from 21 ft. s of n of Agnes to 12 ft. s of n of Tonti	155	6 in.	57 66	3 24	4 75	....	....	20	....	2 76	.....	7 75	45 25	121 61
Aug. 3, 1905	Parker from 875 ft. n of n of Mack to 935 ft. n of n of same	60	6 in.	22 91	....	2 50	....	....	18	....	3 79	.....	3 00	12 59	44 97
Sept. 30, 1905	Piquette from 22½ ft. w of e of Brush to 11 ft. w of e of Beaubien	368	8 in.	192 47	13 74	23 75	....	43 00	22 66	21 53	11 06	37 49	18 40	421 30	804 40

Nov. 8, 1905	Parker from 27 ft. s of n of St. Paul to 271 ft. n of n of same...........	298	6 in.	118 80	....	18 80	....	14 50	1 19	19 84	3 86	.....	14 90	109 79	291 18
Dec. 6, 1905	Palmer from 1 ft. e of e of Hastings to 359 ft. e of same...............	358	6 in.	136 71	....	13 80	....	....	93	....	5 93	.....	17 90	126 75	302 02
Apr. 2, 1906	Pollard from 26 ft. w of e of Dubois to 206 ft. e of e of same...........	232	6 in.	106 79	2 84	6 33	....	13 95	1 16	19 82	2 10	.....	11 60	56 06	230 65
Apr. 3, 1906	Pollard from 24 ft. e of w of Dubois to 241 ft. w of w of same..........	265	6 in.	123 12	....	7 70	....	13 95	90	20 16	3 54	.....	13 25	71 41	254 03
Aug. 12, 1905	Rose from 21 ft. e of w of 18th to 7 ft. e of w of 20th	724	10 in.	490 10	31 98	57 00	....	69 50	31 35	61 47	16 95	105 11	36 20	789 66	1,689 32
Apr. 6, 1906	Rollin from 28 ft. 8 in. w of e of Junction to 287 ft. 7 in. e of e of same	316	6 in.	146 90	4 55	11 55	....	13 95	2 06	21 10	7 08	3 23	15 80	85 21	311 43
May 3, 1906	Railroad st. from Fort st. to Harbaugh, Fort from Lonsdale to Railroad and Harbaugh from Railroad to Dearborn	2,501 62	12 in 6 in	2,855 19	147 15	323 40	....	293 90	14 13	129 23	74 36	.....	128 15	955 18	4.920 64
July 4, 1905	Stevens from 1 ft. e of e of Van Dyke to 430 ft. e of same..........	431	6 in.	163 82	2 34	19 00	....	26 00	6 03	19 50	6 10	.....	21 55	108 00	372 34
Aug. 3, 1905	St. Aubin from 6 ft s of n of Larned to 3 ft. s of s of same.............	28	10 in.	19 25	9 40	7 50	....	....	65	....	4 00	.....	1 40	36 52	78 22
Aug. 16, 1905	Sixteenth from 93 ft. s of s of Milwaukee to old pipe.................	412	6 in.	157 33	....	14 25	....	....	76	....	8 55	.....	20 60	106 33	309 82
Aug. 12, 1905	Standish from 9 ft. e of w of 20th st. to 13 ft. w of e Beecher, also 25 ft. of 8 in. laid in 21st st. from 8 ft. 6 in. s of n of Standish to 33 ft. 6 in. s of n of same................	630 25	10 in 8 in	439 97	20 58	47 50	....	21 00	4 57	18 75	12 33	6 03	32 75	259 34	862 82
Sep. 28, 1905	Spring from 24 ft. w of e of Scotten to 363 ft. e of e of same...........	387	6 in.	144 72	12 32	19 00	....	14 50	1 91	20 43	4 41	...	19 40	116 26	352 95
Sep. 25, 1905	Stanton from 24 ft. s of n of Antoinette to 124 ft. n of n of same......	148	6 in.	55 37	6 24	4 75	....	....	1 13	11 50	5 14	.....	7 40	44 44	135 97
Sep. 23, 1905	Scovell from 4 ft. e of w of Vinewood to 18 ft. e of w of McKinley	298	6 in.	113 04	2 98	14 25	....	14 50	54	19 90	7 99	.....	14 90	93 50	281 60
Oct. 21, 1905	St. Aubin from 12 ft. n of s of Larned to 23 ft. s of n of Jefferson ..	236	10 in.	160 51	11 64	28 50	....	63 95	5 90	42 25	13 69	11 17	11 80	184 70	534 11
Dec. 9, 1965	Sprague from e line of Van Dyke to 222 ft. e of same	222	6 in.	84 78	2 10	9 20	....	26 00	4 99	19 01	7 65	.....	11 10	85 33	250 16
Dec. 7, 1905	Sheridan from 10 ft. n of s of Hendrie to 55 ft. n of n of same.......	105	6 in.	40 10	1 40	4 60	....	11 50	4 42	....	3 50	.....	5 25	29 25	100 02
Jan. 2, 1906	Stanley from 19 ft. w of e of Fourth to 25 ft. w of e of Forsyth	299	8 in.	158 19	7 40	18 40	....	21 00	3 38	19 64	6 68	.....	14 95	113 25	362 84
Apr. 10, 1906	Seyburn from 26 ft. n of s of Forest to 363 ft. s of s of same	389	6 in.	181 41	3 00	18 48	....	24 90	4 49	20 29	4 82	.....	19 45	86 93	363 77
Apr. 24, 1906	Stanley from 21 ft. e of w of 23r. st. to 179 ft. e of e of same........	218	6 in	101 20	4 17	9 24	....	10 95	6 00	....	5 73	.....	10 90	49 45	197 64
Apr. 24. 1906	Shurlie from 29 ft. s of n of Pallister to 168 ft. s of s of same............	208	6 in.	97 47	6 93	11 55	....	24 90	4 06	21 93	4 75	.....	10 40	51 31	233 35

PIPE LAID FROM July 1st, 1905 TO JULY 1st, 1906.—CONTINUED.

Date.	LOCATION OF PIPE.	Feet.	Size.	COST OF CONSTRUCTION.											
				Pipe.	Specials.	Lead.	Gates.		Sundries.	Gate-well.	Hauling.	Repaving.	Sup.& Eng.	Labor.	Total Cost.
							No.	Cost.							
May 7, 1906	Seyburn from 26 ft. n o n of Canfield to 633 ft. s of s of same.......	659	6 in.	306 40	4 57	27 72	....	13 95	2 55	21 65	8 43	.....	32 95	161 03	579 25
May 25,1906	Stephens from 20 ft. n of s of Duncan to 573 ft. s of s of same.......	593	6 in.	275 62	5 04	23 10	....	13 95	4 43	20 26	11 86	.....	29 65	150 82	534 73
June19,1906	Sprague from 224 ft. e of e of Van Dyke to 1 ft. e of w of Maxwell...	353	6 in.	164 62	....	11 55	....	....	1 23	....	5 76	.....	17 65	90 94	291 75
June 2, 1906	Sterling from 2 ft. s of n of Holden to 48 ft. s of n of Milwaukee	452	6 in.	210 34	3 33	18 04	....	....	1 09	....	1 59	.....	22 60	111 31	368 21
June22,1906	Sidney from 24 ft. w of e of Russell to 682 e of e of Guilloz	967	8 in.	621 21	22 28	64 68	....	19 95	9 63	....	18 55	.....	48 35	221 88	1,126 53
June 3, 1906	Scovell from 25 ft. e of w of Chope to 201 ft. e of e of Roosevelt......	447	6 in.	208 46	6 98	18 04	....	13 95	1 31	21 00	5 96	.....	22 35	144 76	442 81
June30,1905	Scovell from 25 ft. e of w of Roosevelt to 14 ft. e of w of McKinley ..	348	6 in.	162 30	1 67	18 48	....	27 90	1 34	42 90	3 50	.....	17 40	142 78	418 27
June16,1906	State from 2 ft. e of e of First st. to 2 ft. w of w of First st....	64	6 in.	27 59	7 40	4 62	....	27 90	3 26	42 29	6 77	.....	3 20	74 89	197 84
Aug. 5, 1905	Thirty-second from 270 ft. n of n line of Herbert to 335 ft. n of same..............................	65	6 in.	24 82	....	2 50	....	....	18	......	5 17	....	3 25	15 12	51 04
Aug.12,1905	Twentieth from 17 ft. s of n of Rose to 7 ft. s of n of Standish	694	10 in.	457 04	23 84	52 25	....	58 00	5 19	38 63	16 95	.....	34 70	456 33	1,142 93
Aug.19,1905	Toledo from 19 ft. e of w of 24th to 28 ft. w of e of 25th	1,059	10 in.	717 62	51 98	71 25	....	139 00	54 46	55 88	34 86	409 34	52 95	1,062 00	2,649 34
Nov. 20,1905	Thirty-fifth from 265 ft. n of n of Rich to s line of Herbert..........	1,048	8 in.	554 13	15 64	59 80	....	32 50	4 16	20 69	24 31	....	52 40	297 00	1,060 63
Apr. 2, 1906	Thirtieth from 487 ft. s of s line of Herbert to 560 ft. s of s line of same..............................	73	6 in.	34 04	....	....	..	....	3 04	....	4 20	.....	....	25 09	66 37
Dec.29, 1905	Theodore from 33 ft. e of w of McDougall to 2 ft. w of Collins	477	6 in.	182 19	4 20	18 40	....	14 50	2 06	39 45	3 54	.....	23 85	151 50	439 69
Apr. 13,1906	Thirty-fourth from 124 ft. n of n line of Rich to 185 ft. n of n line of same..............................	61	6 in.	28 44	....	2 48	....	....	36	....	3 26	.....	3 05	13 93	51 52
Apr. 16,1906	Thirtieth. from 9 ft. n of s of Rich to 120 ft. n of n line of same......	171	6 in.	79 74	....	6 93	....	13 95	1 26	20 06	2 93	.....	8 55	43 14	176 56
Apr.24, 1906	Twenty-third. from 3 ft. s of s of Stanley to 87 ft. n of n line of same	40	6 in.	16 79	....	4 62	....	13 95	68	20 48	5 78	.....	2 00	10 59	85 98

May 17, 1906	Trombly from 198 ft. w of w of Chene to 181 ft. e of e of Dubois..	655	6 in.	205 47	....	22 55	....	....	2 35	....	3 50	....	32 75	172 04	538 66
Apr. 9, 1906	Vermont from 210 ft. n of n of McGraw to 1 ft. s of s of Piquette....	337	6 in.	152 50	....	11 55	....	....	1 04	....	6 80	.....	16 35	90 68	278 92
May 17, 1906	Vermont from 27 ft. s of n of Hancock to 132 ft. n line of same......	159	6 in.	73 20	8 60	13 86	....	13 95	1 27	20 77	4 09	.....	7 95	105 00	248 70
May 22, 1906	Vermont from 3 ft. n of n of Grand River to 87 ft. s of s of Lysander, also 48 ft. of 6 in. in Canfield from 31 ft. w of e of Vermont to 17 ft. e of e of same..................	367 48	6 in 6 in	192 60	11 75	18 48	....	....	3 34	21 00	5 08	.....	20 75	178 38	451 33
Aug 29, 1905	Wight st. from 4 ft. e of e of J. Campau to 3 ft. w of w of same..	77	6 in.	29 41	4 80	7 15	....	29 00	4 77	39 63	5 25	.....	3 05	43 48	167 34
Sep. 23, 1905	Wellington from w line of Russell to 331 ft. 6 in. w of w of same....	331 6 n	6 in.	123 89	4 54	14 25	....	26 00	6 73	18 26	3 22	.....	16 60	52 34	265 83
Sep. 14, 1905	Washington ave. alley w of from 20 ft. s of n of Grand River to 13 ft. n of s of Clifford..................	334	8 in.	174 49	14 92	19 00	....	24 00	26 52	repairs 9 00	9 06	.....	16 70	353 93	647 62
Oct. 4, 1905	Wabash from 7 ft. s of s of Grand River to 18 ft. s of s of Lysander..	167	8 in.	88 30	13 18	12 75	....	42 00	17 81	41 44	7 00	44 69	8 35	249 33	524 35
Sep. 26, 1905	Warren from 26 ft. w of e of Wabash to 36 ft. e of n of Grand River....	1,162	8 in.	601 19	45 66	68 20	....	109 50	47 90	178 70	45 47	344 87	58 10	1,087 69	2,587 28
Oct. 23, 1905	Willard from 257 ft. e of e line of Van Dyke to 309 ft. e of w line of same..	52	6 in.	19 86	1 68	2 50	....	....	12	....	2 00	.....	2 60	18 99	47 75
Oct. 15, 1905	Woodbridge alley s of from 36 ft. e of w of Beaubien to 46 ft. e of w of Brush........................	290	6 in.	108 98	7 78	13 80	....	29 00	15 69	39 70	8 40	.....	14 50	219 78	457 63
Dec. 4, 1905	Waterloo from 26 ft. w of e of Parker to 15 ft. w of e of Maxwell ...	310	6 in.	118 38	3 52	9 20	....	14 50	1 06	19 46	7 00	.....	15 50	68 88	257 50
May 16, 1906	Wellington from 246 ft. e of w of Greely to 315 ft. e of w of same...	69	6 in.	31 24	....	3 30	....	....	21	....	4 79	.....	3 45	25 51	68 50
May 19, 1906	Warren from 23 ft. w of e of Russell to 677 ft. e of e of Riopelle....	1,200	10 in.	1,006 37	35 50	98 39	..	69 85	20 59	80 63	22 52	.....	60 00	697 97	2,091 82

PIPE LAID FOR THE PRIVATE USE OF MORGAN & WRIGHT, THE MICHIGAN STEEL BOAT CO., AND THE STATE FAIR ASSOCIATION NOV. 9, 1905 to DEC. 1905.

Date. 1906.	LOCATION OF PIPE.	Feet.	Size.	COST OF CONSTRUCTION.											
				Pipe.	Spe-cials.	Lead.	Gates.		Sun dries.	Gate-wells.	Haul-ing.	Re-pav-ing.	Sup. & Eng.	Labor.	Total Cost.
							No.	Cost.							
Nov. 9 to Dec. 16, 1905.	Morgan & Wright in private property s of Jefferson ave. for fire protection line, with the Steel Boat Co. "joint acc't..	716 205	10 8	$689 10	$51 37	121 44	....	and valves 306 10	28 88	67 62	20 10	15 02	48 60	992 18	2340 41
	Fire connection Morgan & Wright..	12	10	9 07	....	82	....		05	....	60	......	60	5 50	16 64
	Private road Morgan & Wright	541	6	225 01	9 31	20 24	....	15 95	3 19	22 24	8 87	......	27 05	183 71	465 57
	Michigan Steel Boat Co............	230	6	86 94	24 20	20 24	....		2 35	....	1 15	......	11 50	130 43	276 81
	Fire protection and private road...	190	8	109 92	7 19	15 18	....	23 10	3 51	....	95	.....	9 50	146 11	315 46
	Total..................................	1945	....	1220 04	92 07	177 92	....	345 15	37 98	89 86	31 67	15 02	97 25	1307 93	3414 89
	State Fair Association	137 21106 2	4 6 8	836 28	29 42	85 50	....	66 50	11 42	258 37	68 49	......	112 45	858 50	2326 93
	Total..................................	2249	....												

SUMMARY OF THE AMOUNT OF PIPE LAID IN DETROIT AND VILLAGES OUTSIDE, FROM JULY 1st, 1905, TO JULY 1st, 1906.

LOCATION OF PIPE.	Feet.	Size.	COST OF CONSTRUCTION										
			Pipe.	Specials.	Lead.	Gates.	Sundries	Gatewell	Hauling.	Re-paving	Sup. & Eng.	Labor.	Total Cost.
City of Detroit	202 43,179 12,673 22,191 3,606 80	4 in. 6 in. 8 in. 10 in. 12 in. 16 in.	$42,765 50	$2,226 97	$4,558 16	$4,724 78	$1,679 53	$4,355 46	$2,192 49	4,124 11	$3,784 30	$45,445 76	$115,860 06
Total	81,881												
Village of Delray Prior to annexation	47 2,371	4 in. 6 in.	914 84	22 64	96 50	58 00	8 15	74 38	47 00	... .	118 55	422 16	$1,762 22
Total	2,418												
Village of Woodmere Prior to annexation	2,638 3,462	4 in. 6 in.	1,946	24 30	233 15	124 50	41 26	182 23	112 80	....	305 00	1,564 68	$4,514 38

PIPE LAID OUTSIDE THE CITY JULY 1, 1905 to JULY 1906.

LOCATION OF PIPE.	Feet.	Size.	Pipe.	Specials.	Lead.	Gates.	Sundries	Gatewell	Hauling.	Re-paving	Sup. & Eng.	Labor.	Total Cost.
Village of Fairview	3,108 13,806	4 in. 6 in.	$6,283 31	$118 12	$573 15	$190 50	$97 63	$181 62	$228 21	....	$845 70	$5,511 18	$14,029 42
Total	16,914	....											
Village of Highland Park	10,486	6 in.	4,737 77	74 64	364 49	214 65	74 85	227 06	199 86	....	524 30	3,131 93	9,549 55
Village of Hamtramck	1,100	6 in.	461 64	41 30	40 37	15 95	2 39	20 16	12 23	....	55 00	290 27	989 31

MEMORANDA:— PIPE LOWERED AND RELAID AS FOLLOWS

LOCATION OF PIPE.	Feet.	Size.	Pipe.	Specials.	Lead.	Gates.	Sundries	Gatewell	Hauling.	Re-paving	Sup. & Eng.	Labor.	Total Cost.
West Boulevard for Park Board	11	6	451	5 50	2 53	....	18 42	repairs	5 50	....	17 27	249 00	302 73
Greenwood Avenue Subway	108	6	45 37	.. ....	27 83	....	24 13	222 66	27 50	....	158 10	1,429 10	1,929 69
Total	119	6	49 88	5 50	30 36	....	42 55	222 6	33 90	....	170 70	1,678 10	2,232 42
Alley North Ferry "Relaid"	284	6	....	8 12	2 13	14 50	47	19 50	2 75	.. ..	14 20	123 91	183 58

RECAPITULATION

TOTAL PIPE LAID, LOWERED AND RELAID.

		FEET	COST
Detroit	City	81881	$115,860.06
Delray	City	2418	1,762.22
Woodmere	City	6100	4,514.38
Fairview		16914	14,029.42
Highland Park		10486	9,549 55
Hamtramck		1100	939.31
		118,899 feet or 22 $\frac{2739}{5280}$ miles	$146654.94
Lowered and relaid			2416.00
Grand Total			$149,070.94
Laid for Private Use			$5,741.82

Respectfully Submitted,

JOHN DELANY,

Supt. of Construction.

SUPPLEMENT.

BOARD OF MANAGEMENT OF DETROIT WATER WORKS.

Board of Trustees appointed by Common Council, February 24th, 1852; organized March 1st, 1852.

Shubael Conant, Chairman. Edmund A. Brush.
Henry Ledyard. Wm. R. Noyes.
Jas. A. Van Dyke.

1853.

On the 16th of May, 1853, the Board of Water Commissioners of the City of Detroit was organized under an act previously approved by the Common Council and passed by the Legislature, February 14th, 1853. The term of service was determined by lot, as follows:

Jas. A. Van Dyke,	for 3 years
Edmund A. Brush,	for 4 years
Henry Ledyard,	for 5 years
Shubael Conant,	for 6 years.
Wm. R. Noyes,	for 7 years.

Shubael Conant was elected President, who, finding the duties too arduous, resigned July 30th, and Edmund A. Brush was elected.

1854.

Edmund A. Brush, President. Jas. A. Van Dyke.
Shubael Conant. Wm. R. Noyes.
Henry Ledyard.

1855.

Edmund A. Brush, President.
Henry Ledyard.
Shubael Conant.
William R. Noyes.
James A. Van Dyke, died May 8th.
A. D. Fraser, appointed to fill vacancy.

1856.

Edmund A. Brush, President.
Shubael Conant.
Wm. R. Noyes.
Alexander D. Fraser, re-appointed May 1st, for 5 years
Henry Ledyard.

1857.

Edmund A. Brush, President, re-appointed May 1st, for 5 years.
Henry Ledyard.
Alexander D. Fraser.
William R. Noyes.
Shubael Conant.

1858.

Edmund A. Brush, President.
Shubael Conant.
Alexander D. Fraser.
Henry Ledyard, re-appointed May 1st, for 5 years.
Wm. R. Noyes.

1859.

Edmund A. Brush, President.
Alexander D. Fraser.
Wm. R. Noyes.
Shubael Conant, term expired May 1st, and
Julius D. Morton, appointed for 5 years.
Henry Ledyard, vacated by moval from city, and
John V. Ruehle, appointed May 1st to fill vacancy.

1860.

Edmund A. Brush, President.
Alexander D. Fraser.
Julius D. Morton.
William R. Noyes, re-appointed May 1st, for 5 years.
John V. Ruehle.

1861.

Edmund A. Brush, President.
Alexander D. Fraser, re-appointed May 1st for 5 years.
Jno. V. Ruehle, resigned Sept. 16th, and
Chauncey Hurlbut appointed to fill vacancy.

1862.

Edmund A. Brush, President, re-appointed May 1st, for 5 years.
Wm. R. Noyes.
Julius D. Morton.
Chauncey Hurlbut.
Alexander D. Frazer.

1863.

Edmund A. Brush, President.
Alexander D. Frazer.
Wm. R. Noyes.
Julius D. Morton.
Chauncey Hurlbut, term expired May 1st, and
Stanley G. Wight, appointed for 5 years.

1864.

Edmund A. Brush, President.
Alexander D. Frazer.
Wm. R. Noyes.
Julius D. Morton, term expired May 1st.
Stanley G. Wight.

1865.

Edmund A. Brush, President.
Wm. R. Noyes, resigned Jan. 10, and Jacob S. Farrand appointed to fill vacancy, Term expired May 1st. Re-appointed for 5 years.
Alexander D. Frazer.
Stanley G. Wight.
Julius D. Morton, re-appointed for 5 years from May 1st, 1864. Died Feb. 1865, and
Jno. Owen appointed to fill vacancy.

1866.

Edmund A. Brush, President.
Alexander D. Fraser, re-appointed May 1, for 5 years.
Stanley G. Wight.
Jacob S. Farrand.
Jno. Owen.

1867.

Edmund A. Brush, President, re-appointed May 1, for 5 years.
Alexander D. Fraser.
Jacob S. Farrand.
Jno. Owen.
Stanley G. Wight.

1868.

*Edmund A. Brush, President.
Stanley G. Wight, term expired May 1, and
Chauncey Hurlbut appointed for 5 years.
Jacob S. Farrand.
John Owen.
Caleb Van Husan.

*Edmund A. Brush resigned January 28, and Caleb Van Husan appointed to fill vacancy, and Alexander D. Fraser elected President.

1869.

Alexander D. Fraser, President.
John Owen, re-appointed May 1, for 5 years.
Jacob S. Farrand.
Caleb Van Husan.
Chauncey Hurlbut.

1870.

Alex. D. Fraser, President.
Jacob S. Farrand, re-appointed May 1, for 5 years.
Jno. Owen.
Caleb Van Husan.
Chauncey Hurlbut.

1871.

*Alex. D. Fraser, President.
Jacob S. Farrand.
Caleb Van Husan.
Chauncey Hurlbut.
John Owen.

*Term expired May 1, and Samuel F. Hodge appointed for 5 years. Jacob S Farrand elected President.

1872.

Jacob S. Farrand, President.
Jno. Owen.
*Caleb Van Husan.
Samuel F. Hodge.
Chauncey Hurlbut.

*Term expired May 1st, and Elija Smith appointed for 5 years.

1873.

*Chauncey Hurlbut, President. Jacob S. Farrand.
Jno. Owen. Samuel F. Hodge.
Elija Smith.

*Term expired and re-appointed. Elected President, May, 1872.

1874.

Chauncey Hurlbut, President. Jacob S. Farrand.
*Jno. Owen. Samuel F. Hodge.
Elija Smith.

*Term expired and re-appointed.

1875.

Chauncey Hurlbut, President. *Jacob S. Farrand.
Jno. Owen. Samuel F. Hodge.
Elija Smith.

*Term expired and re-appointed.

1876.

Chauncey Hurlbut, President. Jacob S. Farrand.
Jno. Owen. *Samuel F. Hodge.
Elija Smith.

*Term expired and re-appointed.

1877.

Chauncey Hurlbut, President. Jacob S. Farrand.
Jno. Owen. Samuel F. Hodge.
*Michael Martz.

*Elija Smith's term expired and Michael Martz appointed to fill vacancy.

1878.

*Chauncey Hurlbut, President. Jacob S. Farrand.
Jno. Owen. Samuel F. Hodge.
Michael Martz.

*Term expired and re-appointed'

1879.

Chauncey Hurlbut, President. Jacob S. Farrand.
Michael Martz. *Jas. Beatty.
*Jno. Pridgeon.

*Jno. Owen's term expired and John Pridgeon appointed to fill vacancy. Samuel F. Hodge resigned and Jas. Beatty appointed to fill vacancy.

1880.

Chauncey Hurlbut, President. *Jacob S. Farrand.
Michael Martz. Jas. Beatty.
Jno. Pridgeon.

*Term expired and re-appointed.

1881.

Chauncey Hurlbut, President. Jacob S. Farrand.
Michael Martz. *Jas. Beatty.
Jno. Pridgeon.

*Term expired and re-appointed.

1882.

Chauncey Hurlbut, President. Jacob S. Farrand.
*Michael Martz. Jas. Beatty.
Jno. Pridgeon.

*Term expired and re-appointed.

1883.

*Chauncey Hurlbut, President. Jacob S. Farrand.
Michael Martz. Jas. Beatty.
Jno. Pridgeon.

*Term expired and re-appointed.

1884.

Chauncey Hurlbut, President. Jacob S. Farrand.
Michael Martz. Jas. Beatty.
*Jno. Pridgeon.

*Term expired, and Marshall H. Godfrey appointed

1885.

*Jacob S. Farrand, President. Michael Martz.
Marshall H. Godfrey. *Edwin F. Conely.
*Samuel G. Caskey.

*Jas. Beatty died and Edwin F. Conely appointed to fill vacancy.
*Chauncey Hurlbut died and Samuel G. Caskey appointed to fill vacancy.
*Jacob S. Farrand's term expired and re-appointed.

1886.

Jacob S. Farrand, President. Michael Martz.
Marshall H. Godfrey. *Jno. Pridgeon.
Samuel G. Caskey.

*Edwin F. Conely's term expired and Jno. Pridgeon appointed to fill vacancy.

1887.

Jacob S. Farrand, President. Jno. Pridgeon.
Marshall H. Godfrey. Samuel G. Caskey.
*Joseph Nagel.

*Michael Martz term expired and Joseph Nagel appointed to fill vacancy.

1888.

Jacob S. Farrand, President. Jno. Pridgeon.
Marshall H. Godfrey. *Samuel G. Caskey.
Joseph Nagel.

*Term expired and re-appointed.

1889.

Jacob S. Farrand, President. Jno. Pridgeon.
Samuel G. Caskey. Jos. Nagel.
*August Goebel.

*Marshall H. Godfrey resigned January 1, 1889. August Goebel appointed to fill vacancy. Term expired May 1st, and re-appointed.

1890.

Jno. Pridgeon, President.
August Goebel.
Joseph Nagel.
*Henry M. Duffield.
Samuel G. Caskey.

***Jacob S. Farrand's term expired, and Col. Duffield was appointed to fill vacancy July 9th, 1890; John Pridgeon resigned as President of the Board, on account of ill-health, and Henry M. Duffield was elected to fill vacancy.**

1891.

Henry M. Duffield, President.
*Jno. Pridgeon.
August Goebel.
Samuel G. Caskey.
Joseph L. Hudson.

***John Pridgeon's term expired May 1st, and Frank E. Kirby was appointed for a term of 5 years.**

1892.

Samuel G. Caskey, President.
Henry M. Duffield.
August Goebel.
Joseph L. Hudson.
Frank E. Kirby.

1893.

August Goebel, President.
Samuel G. Caskey.
Frank E. Kirby.
Henry M. Duffield.
Joseph L. Hudson.

1894.

Henry M. Duffield, President.
Frank E. Kirby.
Albert L. Stephens.
De Witt H. Moreland.
Edward W. Pendleton.

A. L. Stephens appointed to succeed J. L. Hudson.
D. W. H. Moreland appointed to succeed S. G. Caskey.
Clarence A. Black appointed to succeed August Goebel.
C. A. Black resigned and E. W. Pendleton appointed to succeed him from Dec, 1

1895.

Frank E. Kirby, President.
Albert L. Stephens.
DeWitt H. Moreland.
Edward W. Pendleton.
Darius D. Thorp.

1896.

Albert L. Stephens, President.
John P. Huckestein.
Edward W. Pendleton.
Darius D. Thorp.
John W. McGrath.

D. W. H. Moreland resigned to accept Commissionership on Board of Public Works, and J. P. Huckestein was appointed to fill vacancy.

Frank E. Kirby's term expired and J. W. McGrath was appointed to succeed him

1897.

Edward W. Pendleton, President.
James W. Millen.
John W. McGrath.
Darius D. Thorp.
August Goebel.

August Goebel, appointed to succeed A. L. Stephens. Resigned January 1, 1898 and Joseph J. Noeker was appointed to fill vacancy.

John P. Huckestein resigned and James W. Millen was appointed to fill vacancy

1898.

Edward W. Pendleton, President.
John W. McGrath.
Darius D. Thorp.
Joseph J. Noeker.
James Meathe.

1899.

Darius D. Thorp, President.
Joseph J. Noeker.
John W. McGrath.
*James Meathe.
Edward W. Pendleton.

*James Meathe died September 21st, 1899, and Benjamin Guiney was appointed to fill vacancy.

1900.

John W. McGrath, President.
*Benjamin Guiney.
Joseph J. Noeker.
Edward W. Pendleton.
Darius D. Thorp.

Benjamin Guiney resigned, and John Zynda was appointed to fill vacancy.

1901.

Joseph J. Noeker, President.
Edward W. Pendleton.
John Zynda.
Darius D. Thorp.
Joseph J. Crowley.

1902.

John Zynda, President.
Darius D. Thorp.
Edward W. Pendleton.
Joseph J. Crowley.
John Schroeder.

1903.

Edward W. Pendleton, President.
Darius D. Thorp.
Joseph J. Crowley.
John Schroeder.
John Zynda.

1904.

Darius D. Thorp, President.
Joseph J. Crowley.
John Schroeder.
John Zynda.
Edward W. Pendleton.

1905.

Joseph J. Crowley, President.
John Zynda.
John Schroeder
Edward W. Pendleton.
John F. Dodge.

1906.

John Schroeder, President.
Edward W. Pendleton.
John Zynda.
John F. Dodge.
Frederick J. Clippert.

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FIFTY-FIFTH ANNUAL REPORT OF THE BOARD OF WATER COMMISSIONERS

WATER WORKS 1874.

TO THE COMMON COUNCIL OF THE CITY OF DETROIT

FOR YEAR
ENDING JUNE 30TH
1907

FIFTY-FIFTH ANNUAL REPORT

OF THE

Detroit

BOARD OF WATER COMMISSIONERS

OF THE CITY OF DETROIT

TO THE

COMMON COUNCIL OF THE CITY OF DETROIT

TOGETHER WITH THE

REPORTS OF THE OFFICERS OF THE BOARD

FOR YEAR

ENDING JUNE 30TH, 1907

DETROIT FREE PRESS PRINTING COMPANY,
1907.

CONTENTS.

Page.

Report of the Commissioners.. 7

Financial Report of the Secretary..12

Report of the General Manager..29

Report of the Civil Engineer..35

Report of Superintendent of Meters and Inspection....................46

Report of the Chief Engineer at Pumping Works.....................54

Report of the Superintendent of Construction.....................59

Supplement..91

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BOARD OF WATER COMMISSIONERS

OF THE

CITY OF DETROIT.

MEMBERS:

JOHN ZYNDA, 1908 JOHN F. DODGE, 1910
EDWARD W. PENDLETON, 1909 FREDERICK J. CLIPPERT, 1911
JAMES H. POUND, 1912

COMMITTEES:

Ways and Means	Commissioners PENDLETON, POUND.
Extension and Construction,	Commissioners DODGE, CLIPPERT.
Pumping Works	Commissioners CLIPPERT, PENDLETON.
Supplies	Commissioners POUND, DODGE.

The President is ex-officio member of each committee.

OFFICERS:

President	JOHN ZYNDA.
Vice-President	EDWARD W. PENDLETON
General Manager	H. S. STARKEY.
Secretary	BENJ. F. GUINEY.
Superintendent of Construction	ANTHONY F. DIERKES'
Supt. of Meters and Inspection	THOMAS R. PUTNAM.
Civil Engineer	CLARENCE W. HUBBELL.
Chief Engineer at Pumping Works	URIAH GOULD.
Bookkeeper	W. W. WILCOX.
Receiving Clerk	GEORGE E. KUNZE.
Cashiers	D. C. GROBBEL. CHARLES W. KEENA.
Meter Clerks	W. W. COONEY. CHAS. F. GILMER.
Permit Clerk	GEO. BARRIE.
Collectors	FRANK PETZ. ALBERT L. STADLER. ANTHONY VOGEL. ANTHONY J. LOOK. WM. COSGROVE. JOHN J. ROBINSON. M. A. DETTLING. THOMAS J. CLANCY. JOHN C. BECKER. GEO. P. MOOG.

THE BOARD OF WATER COMMISSIONERS

OF THE

CITY OF DETROIT.

RATES JULY 1, 1906.

METER RATES.

Payable Quarterly.	QUARTERLY
First 30,000 gals	$1 75
All in excess of 30,000 gals	2¼ cts. per M.
Minimum Rate	1 75

ASSESSMENT RATES.

	PER ANNUM
For Family, household purposes	$2 60
Additional Families to first, in same house supplied through same faucet, each family	1 40
Green Houses.—Special rates.	
Private Stable, for each horse	1 20
Livery Stables, " " "	1 20
Dray and Team Horses, each	60
Cows, each	60
Stores and Offices, from	$1 00 to 12 00
Bakeries, average daily use for each barrel of flour	2 00
Groceries and Provision Stores, from	$3 00 to 50 00
Saloons, from	6 00 to 50 00
Bar, with faucet, from	8 00 to 50 00
Fish Houses, from	6 00 to 50 00
Beer Pump	2 00
Barber Shops, each chair	2 00
Slaughter Houses.—Special rates.	
Hotels and Taverns, in addition to family rate, each room	60
Boarding Schools, from	$4 00 to 50 00
Printing Offices.—Special rates.	
Butcher Stalls, each not less than	3 00
Workshops, for 10 persons or under	3 00
" for each additional 10 persons	1 00
Boarding Houses, in addition to family rate, each boarder or roomer,	40
Estimated quantities of water each 1,000 gallons	07
Building Purposes, each 1 M brick	03
" " " 100 yards plastering	05
" " " perch stone	01
" " minimum	50

FIXTURES.

Bath Tub, for families, 1st tub	$1 00
" " each additional tub	60
" " public, each tub	4 00
Automatic Water Closets, for family, 1st closet	1 60
" " " each additional	60
" " " for hotels, stores, factories, etc., for 10 persons	2 00
" " " each additional person	20
Rod Water Closets, not less than	6 00
Urinals, not less than	2 00
Wash Hand Basins, for family, each	48
" " " for other purposes, each person	15
Hose Bibb or Connection, premises 30 feet front or less	60
" " " " 30 feet to 60 feet	80
" " " " 60 feet to 100 feet	1 60
Special Rates for larger grounds.	
Fountains	$5 00 to 20 00
Street Sprinklers, each wagon	50 00

Where there is a waste of water an increase of rates will be made.

ANNUAL REPORT

OF THE

BOARD OF WATER COMMISSIONERS

OF THE

CITY OF DETROIT.

JULY 1, 1906—JULY 1, 1907.

To the Honorable the Common Council:

GENTLEMEN—The Board of Water Commissioners of the City of Detroit, respectfully submits herewith its fifty-fifth annual report, embracing a statement of the condition and operation of the department, as required by statute.

The record of the past year has been uneventful, no special work of construction having been undertaken during this period. The rapid growth of the city, with large additions of territory, has demanded an extraordinary increase in the extent of the distribution system. The entire amount of pipe laid during the year has been 29 miles, 4,627 feet, of which 23,789 feet (at a cost of $54,308) was laid for the purpose of enlarged fire protection.

Strenuous efforts are made to keep well up with the demands of the Fire Department, and no reports of short supply have been received during the past year.

Increasing requirements are rapidly over-taking the capacity of the present pumping equipment and prudent foresight demands the early installation of a new high pressure engine, and also the construction of a large trunk line for distribution, extending well into the heart of the city, which will strengthen the circulation throughout the arteries of the entire system. More spacious accommodation for coal storage will also be required.

Plans are already matured for the extension of a 42 inch main, from Vinewood Avenue to Artillery Avenue, a distance of 7,590 feet. This work will be completed January 1st, 1908.

On account of the bursting of distribution mains near the pumping station, a so-called Emergency Station is being established on Fisher Avenue, near Jefferson Avenue, provided with an air-chamber of 1,000 cubic feet capacity, as a protection against sudden pressure or "water hammer." The 42 inch mains at this point have been united by a 30 inch connection.

The advanced price of iron pipe and of all material has proportionately increased the cost of extension and construction. A strict economy of administration, however, has been maintained, and the attention of your Honorable Body is called to the following comparison of expense of administering the Water Department of Cleveland, Milwaukee and Detroit for the years 1905-6:

	CLEVELAND.	MILWAUKEE.	DETROIT.
Population supplied	460,000	325,000	384,000
Cost of plant	$13,836,000.00	$5,545,000.00	$8,173,000.00
Cost of plant per consumer	30.07	17.06	21.03
Bonds outstanding	4,266,000.00	326,500.00	966,000.00
Operation and maintenance per million gals. delivered (without bond interest)	18.35	15.81	6.97
Operation and maintenance per million gals. delivered (with bond interest)	25.77	17.15	9.04
Operation and maintenance (exclusive of interest) annual cost per consumer	0.88	0.60	0.41
Daily number of gallons per capita	131	91	160
Total water rates collected	807,070.00	446,697.00	501,351.00
Total water rates collected per consumer	1.75	1.37	1.31

It is a gratification to record that Detroit stands far above all other lake cities in its immunity from Typhoid Fever. Detroit also stands, in this regard, at the head of the larger cities of the entire country, according to a carefully prepared report for the year 1905, by the Superintendent of the Water Department of Cleveland. This estimate is based upon the number of deaths per 100,000 population, as follows:

Detroit, 12.2; Grand Rapids, 50.0; New York, 16.2; Chicago, 16.6; Philadelphia, 47.6; St. Louis, 18.7; Boston, 19.7; Baltimore, 35.8; Cleveland, 15.1; Buffalo, 22.5; Cincinnati, 40.0; Pittsburg, 101.6; Alleghany, 128.6; Milwaukee, 20.3; New Orleans, 31.1; Washington 45.4; Indianapolis, 194.3; Kansas City, 42.6; San Francisco, 19.1.

It will not answer, however, for us to rest in fancied security. The experience of other cities teaches the lesson that the insidious enemy can only be warded off by the constant exercise of every means of defense. The report of the Board of Health shows an increase in typhoid during the past year.

The amount of water pumped during the year was 25,118,295,041 gallons, an average of 68,817,247 gallons daily, with a daily per capita of 166.7 gallons.

The total receipts during the fiscal year aggregate $700,511.98. The total expenditures amounted to the sum of $680,002.85, of which operation and maintenance was $195,946.24; Extension and Construction, $342,619.49; Bonds redeemed $16,000.00; Interest $35,588.75; Real Estate and Loan Account, $86,125.00; Hulbut Fund, $3,723.37.

Detailed reports of the various departments are submitted herewith, to which your attention is especially called.

The Board invites the inspection of your Honorable Body of all transactions connected with this department.

Respectfully, submitted,

JOHN ZYNDA,
EDWARD W. PENDLETON,
JOHN F. DODGE,
FREDERICK J. CLIPPERT,
JAMES H. POUND.
Board of Water Commissioners of the City of Detroit.

Dated, June 30, 1907.

REPORT OF THE SECRETARY.

DETROIT, MICH., OCT. 22ND., 1907.

To the Board of Water Commissioners of the City of Detroit:

GENTLEMEN—I beg to submit my annual report, as Secretary, to your Board for the fiscal year, ending June 30th, 1907.

Yours respectfully,
BENJ. F. GUINEY,
Secretary.

Receipts.

Water rates assessed	$347,420 25	
Water rates metered	201,544 90	$548,965 15
Percentage	6,576 19	
Shutting off and letting on	230 25	6,806 44
Service cocks, permits	12,692 75	
Service cocks, material and labor	213 30	12,906 05
Plumbers' licenses		441 75
City of Detroit, general tax levy		75,000 00
Real estate revenue and expense, rentals		2,982 13
Meter, material and labor		541 95
Meter repairs and expenses, material and labor		15 10
Pumping works, material		830 87
Pumping water, material		97 12
Repairing leaks, material and labor		86 76
Service extensions		214 66
Horse expense		165 12
Wagon and harness		4 00
Office furniture and fixtures		5 68
Iron pipe, material and labor	5,001 18	
Bonus	2,790 38	

Village of Highland Park, estimate for laying pipe	6,580 49	
Village of Saint Clair Heights, estimate for laying pipe	2,560 00	
Village of Hamtramck, estimate for laying pipe	1,871 00	
Village of Ecorse, estimate for laying pipe	1,608 19	
F. A. Lyon, et al. estimate for laying pipe in Village of Hamtramck	581 40	
A. M. Low, estimate for laying pipe in Village of Hamtramck	328 00	
		21,320 64
Village of Fairview, estimate for laying pipe		23,638 00
Interest, interest on General Fund	2,716 86	
Interest on Sinking Fund	741 35	
Interest on Hurlbut Fund	9 76	
		3,467 97
Hurlbut Fund, from Trustees	3,020 84	
Error Pay Roll	1 75	
		3,022 59
Total receipts for the year		$700,511 98

Disbursements.

OPERATION AND MAINTENANCE.

Office Account—

General manager, secretary and clerks	$ 28,400 25
Watchmen and janitor	2,179 50
General work and carpenter	1,644 29
Books, printing and stationery	1,555 81
Telephone rental	240 00
Advertising and subscription	114 59
Stamped envelopes and postage	248 50
Towel supply	84 50
Street car tickets	18 00
Disinfectant	10 00
Ice	100 45
Coal	427 02
Gas and electric power	18 80
Bond premiums	110 00
Horse care	181 00
Horse shoeing	32 50
Expert accountant, J. A. Dresser	143 75

Lawyer fees, F. A. Baker, Fairview sewerage case	500 00	
Miscellaneous	220 95	
		$ 36,229 91

Service Connections and Leaks Account—

Superintendent inspection and labor	$ 17,330 67	
Service cocks, sleeves and valves	4,591 91	
Tools and repairs	451 38	
Printing	72 00	
Telephone rental	40 00	
Car tickets	195 00	
Re-paving	224 88	
Freight and express charges	4 87	
Pipe and fittings	262 04	
Packing and waste	34 39	
Miscellaneous	7 43	
		$ 23,214 57

Pumping Water Account—

Engineers, firemen, coal passers	$ 37,638 10	
Coal	43,369 66	
Unloading coal	5,099 97	
Boiler, engine supplies and repairs	2,161 62	
Engine Oil and grease	879 49	
Kerosene oil and gasoline	14 82	
Waste packing and rags	305 40	
Boiler inspection	30 00	
Electric fixtures and repairs	73 93	
Hose and couplings	80 91	
Tools and repairs	112 15	
Paint, oil and glass	126 89	
Printing and stationery	15 55	
Telephone rental	55 00	
Ice	103 35	
Towel supply	69 90	
Horse shoeing and harness	43 75	
Horse feed and bedding	109 68	
Express charges	15 03	
Advertising	2 88	
Coal tubs	261 80	
Lumber	67 50	
Analysis Detroit river water	504 50	
Miscellaneous	127 84	
		$ 91,269 72

Repairing Leaks Account—		
Superintendent, clerks and laborers	$ 3,930 14	
Inspection and re-paving	155 26	
Telephone rental	20 00	
Tools and repairs	49 89	
Rubber boots and repairs	33 29	
Pump fittings	51 36	
Electrice light	44 03	
Oil	2 10	
Miscellaneous	52 65	
		$ 4,338 72
Meter Repairs and Expenses—		
Superintendent and Labor	$ 1,069 25	
Meter fittings	760 31	
Express and freight charges	2 74	
		$ 1,832 30
Percentage—		
Superintendent and inspection	$ 7,056 66	
		$ 7,056 66
Inspection—		
Superintendent and inspectors	$ 8,056 63	
Car tickets	190 00	
Electric lamps	38 25	
Printing	21 50	
		$ 8,306 38
Wagon and Harness—		
Harness and repairs	$ 340 20	
Wagon repairs	343 30	
Barn tools	16 45	
Wagon umbrellas	28 00	
		$ 727 95
Office Furniture and Fixtures—		
Furniture and repairs	$ 476 67	
Electric fixtures and repairs	475 85	
Still alarm	101 25	
Steel vault and cases	2,823 90	
Electric blue print machine	291 05	
Boiler inspection	1 50	
Lumber	19 75	
		$ 4,189 97
Real Estate Revenue and Expense—		
Insurance premiums	$ 296 49	
Alterations, commissioner's room	757 52	

Alterations, civil engineer's office	2,092 73	
Alterations, storage yard office	322 16	
Emergency station, first payment	2,800 00	
Repairing R. R. tracks and scales	212 27	
Pipe and fittings	45 39	
Paint, oil and glass	167 53	
Roof repairs	362 01	
Lumber	55 41	
Appraising property at foot of Orleans street	25 00	
		$ 7,136 51
Horse Expense Service Connections—		
Oats, hay and bedding	$ 783 79	
Horse shoeing	142 32	
Veterinary services and drugs	32 10	
Tools	5 81	
		$ 964 02
Horse Expense, Repairing Leaks—		
Oats, hay and bedding	$ 783 54	
Horse shoeing	156 57	
Horse board	180 00	
Veterinary services and drugs	25 30	
Barn tools	2 95	
		$ 1,148 36
Interest on loan account—		
Interest	$ 635 41	
		$ 635 41
Pumping Works Grounds—		
Superintendent and laborers	$ 7,537 02	
Greenhouse and library repairs	35 60	
Tools, fittings, etc	223 24	
Cement, sand and stone	328 62	
Electric fixtures and wiring	122 67	
Paint, oil and glass	128 95	
Ice	113 77	
Seed, plants and flower pots	173 20	
Hose and couplings	98 25	
Telephone rental	20 00	
Car tickets	4 00	
Horse shoeing	16 50	
Towel supply	2 50	
Miscellaneous	91 44	
		$ 8,895 76

Iron Pipe, Construction—

Superintendent and clerks	$ 8,607 65	
Foremen	2,370 55	
Watchmen, teamsters, brick layers	14,710 35	
Laborers	76,872 00	
Iron pipe	103,561 54	
Special castings	7,775 80	
Gates, valves and hydrants	13,154 18	
Pig lead	14,328 34	
Lead pipe and solder	46 18	
Brick, cement, sand and stone	3,598 97	
Lumber	1,064 38	
Coal	586 42	
Tools	447 41	
Repairing tools	129 30	
Lantern globes, nails and fittings	972 67	
Iron beams and T rails	122 74	
Cartage	573 10	
Car tickets	170 00	
Telephone rental	118 93	
Books, printing and stationery	236 15	
Hose and couplings	315 17	
Inspection and re-paving	1,238 11	
Rubber boots and repairs	197 31	
Protecting R. R. tracks, laying water pipe	129 35	
Rope packing and rags	407 93	
Oil and gasoline	149 45	
Paint and glass	33 14	
Doctors' services and damages	460 25	
Advertising	67 20	
Still Alarm	18 75	
Freight charges	34 51	
Refund, Village of Hamtramck	43 41	
Refund, Village of St. Clair Heights	51 51	
Refund, Village of Highland Park	811 04	
Refund, F. A. Lyon, et al.	17 27	
Wood plugs	48 65	
Miscellaneous	311 45	
		$253,781 16

Horse Expense, Iron Pipe—

Oats, hay and bedding	$ 1,581 60
Horse shoeing	300 13
Horse purchases	975 00

Veterinary services and drugs	40 50	
Barn tools	17 51	
		$ 2,914 74
Meter—		
Superintendent, foremen and laborers	$ 5,086 09	
Meters	10,065 13	
Specials and Fittings	96 52	
Telephone rental	60 00	
Printing and stationery	40 80	
Lumber	108 16	
Packing and rags	8 60	
Gasoline	4 67	
Horse shoeing	84 10	
Bicycle repairs	11 75	
Tools and repairs	59 32	
Lead pipe	35 82	
Harness repairs	2 85	
Rubber boots	4 91	
Express and freight charges	7 80	
Miscellaneous	6 36	
		$ 15 682 88
Engineering—		
Civil engineer and assistants	$ 16,624 87	
Tracing cloth and paper	182 96	
Printing, stationery and maps	317 04	
Street car tickets	240 00	
Telephone rental	67 80	
Instruments, tools and fittings	98 10	
Postage stamps	2 00	
Paint and oil	9 00	
Lumber	24 98	
Boat rental	12 00	
Subscription and books	17 00	
Electric power	8 74	
Miscellaneous	105 08	
		$ 17,709 57
Pumping Works, Construction—		
Superintendent, foremen and laborers	$ 6,281 15	
Dock contract, John Ginzel Const. Co.	10,691 74	
Boiler contract, Wickes Bros	9,961 00	
Steam and water piping, P. Wenzel	3,360 96	
Chimney contract, Blay & Co., final payments	2,426 95	
Architects estimates, Field, Hinchman & Smith	1,033 71	

Repairs, engine No. 2	5,593 89	
Tools and fittings	592 40	
Covering boilers	97 00	
Painting stand pipe	150 00	
Advertising	18 70	
Electric fixtures	40 97	
Paint, oil and glass	22 29	
Sand and stone	95 95	
Lumber	103 40	
Stone sidewalk	350 65	
Cartage	36 50	
Rubber Boots	12 16	
Repairs Engineers' House	7 95	
Expenses, Civil and Chief Engineers, Cleveland, etc.	276 80	
Miscellaneous	97 72	
		$ 41,251 89
Village of Fairview—		
Supt., foremen and laborers	11,243 20	
Hydrants	28 80	
Doctors' services	7 25	
		$ 11,279 25
Hurlbut Fund—		
Library assistants, supt., and laborers	3,438 23	
Shrubs, seed and pots	136 44	
Printing and subscription	5 50	
Furniture repairs	6 50	
Tools and fittings	27 61	
Paint, oil and glass	8 24	
Roof repairs	32 00	
Lumber	9 72	
Pipe covering	29 58	
Miscellaneous	26 05	
Towel supply	3 50	
		$ 3,723 37
Bonded Indebtedness—		
Bonds redeemed	$ 16,000 00	
		$ 16,000 00
Interest—		
Coupons	$ 35,588 75	
		$ 35,588 75
Loan Account—		
Payment of Loan	$ 75,000 00	
		$ 75,000 00

Real Estate—

New Pumping Works addition, J. E. Edwards Estate	$ 5,000 00	
New Pumping Works addition, Jennie B. Nash	5,000 00	
Interest	1,125 00	
		$ 11,125 00

RECAPITULATION OF EXPENDITURES, FOR OPERATION, MAINTENANCE, CONSTRUCTION AND INDEPENDENT.

For Operation and Maintenance—		
Office	$ 36,229 91	
Service connections	23,214 57	
Pumping water	91,269 72	
Repairing leaks	4,338 72	
Meter repairs and expenses	1,832 30	
Percentage	7,056 66	
Inspection	8,306 38	
Wagon and harness	727 95	
Office furniture and fixtures	4,189 97	
Real estate revenue and expense	7,136 51	
Horse expense, service connections	964 02	
Horse expense, repairing leaks	1,148 36	
Pumping works grounds	8,895 76	
Interest	635 41	
		$195,946 24
For Construction—		
Iron pipe	$253,781 16	
Iron pipe, horse expense	2,914 74	
Meter	15,682 88	
Engineering	17,709 57	
Pumping works	41,251 89	
Fairview Village	11,279 25	
		$342,619 49
For Miscellaneous—		
Hurlbut Fund	$ 3,723 37	
Bonded indebtedness	16,000 00	
Interest	35,588 75	
Loan account	75,000 00	
Real estate	11,125 00	
		$141,437 12
Total		$680,002 85

GENERAL RECAPITULATION OF EXPENDITURES.

Total Operation	$195,946 24	
Total Construction	342,619 49	
Total Miscellaneous	141,437 12	
Total		$680,002 85

RECAPITULATION OF EXPENDITURES, JULY 1ST, 1906, TO JUNE 30TH, 1907.

1906.		
July	$ 57,670 50	
August	63,049 02	
September	45,948 22	
October	48,427 49	
November	46,205 69	
December	57,244 90	
1907.		
January	128,013 51	
February	43,464 68	
March	25,040 32	
April	32,902 04	
May	77,467 25	
June	54,569 23	
Total		$680,002 85

TOTAL RECEIPTS FROM JULY 1ST, 1906 TO JULY 1ST, 1907.

1906.		
July	$141,701 82	
August	71,182 38	
September	17,252 70	
October	116,822 15	
November	16,375 56	
December	25,154 62	
1907.		
January	$125,106 34	
February	21,277 74	
March	15,731 71	
April	111,713 65	
May	17,716 46	
June	20,476 85	
Total receipts	$700,511 98	
Cash on hand June 30th, 1906	4,366 29	
		$704,878 27

With bank deposits as follows:

1906.		
July	$137,533 74	
August	78,044 94	
September	15,533 12	
October	113,198 04	
November	21,419 96	
December	20,708 53	
1907.		
January	$124,568 70	
February	26,314 99	
March	14,260 58	
April	107,265 43	
May	23,677 98	
June	19,647 51	
Total deposits	$702,173 52	
Cash on hand June 30th, 1907	2,704 75	
		$704,878 27

CASH STATEMENT FOR YEAR ENDING JUNE 30, 1907.

		Dr.	
Cash on hand June 30, 1906		$ 4,366 29	
Cash in Bank—			
General Fund	$23,004 14		
Check outstanding	24 50		
	$22,979 64		
Sinking Fund	16,969 64		
Hurlbut Fund	720 00		
Secretary Fund	1,000 00		
		$ 41,669 45	
Total receipts		700,511 98	
			$746,547 72
		Cr.	
Cash on hand June 30, 1907		$ 2,704 75	
Cash in Bank—			
General Fund	$31,688 73		
Sinking Fund	31,122 41		
Hurlbut Fund	28 98		
Secretary Fund	1,000 00		
		$ 63,840 12	
Total disbursements		$680,002 85	
			$746,547 72

THE AMERICAN EXCHANGE NATIONAL BANK.

Detroit, Mich., July 1, 1907.

Benj. F. Guiney, Secretary, Board of Water Commissioners of the City of Detroit:

DEAR SIR—This to certify that the amounts of balances in this bank to the credit of the Board of Water Commissioners of the City of Detroit, at the close of business June 30, 1907, were as follows: General Fund, $31,688.73; Sinking Fund, $31,122.41; Hurlbut Fund, $28.98; Secretary Fund, $1,000.00.

Yours truly,
J. P. WILLIAMS,
Auditor.

Assessments, 1907-1908.

Dist.	WARDS.	FAMILIES.				Increase.	Vacant Tenements.	ASSESSMENTS.		
		Supplied by Meter	Assessed.	Not Supplied.	Whole Number.			1907-1908.	Increase.	Transf'rd to Meter Rolls.
1	Ninth..	595	6383	4	6,982	323	17	$21,754 44	$1,036 82	$289 38
	Fifteenth....	314	3039	3	3,356	342	5	15,893 52	1,606 56	191 64
	Seventeenth.	257	5307	35	5,599	1289	18	27,725 61	6,755 54	175 72
	Total	1166	14729	42	15,937	1954	40	65,373 57	9,398 92	656 74
2	Eleventh....	309	4691	....	5,000	193	21	18,538 60	868 52	316 70
	Thirteenth.	386	4535	1	4,922	384	29	19,802 10	1,833 91	155 56
	Total	695	9226	1	9,922	577	50	38,340 70	2,702 43	472 26
3	First..	1307	3544	....	4,851	360	46	23,895 55	1,258 72	112 52
	Seven'h	456	3587	....	4,043	103	22	13,169 16	228 42	79 48
	Total	1263	7131	....	8,894	463	68	37,064 71	1,487 14	292 00
4	Third..	788	3982	3	4,773	338	33	19,024 76	1,764 88	70 24
	Fifth..	606	4788	1	5,395	335	38	19,202 30	1,231 60	209 92
	Total	1394	8770	4	10,168	673	71	38,227 06	2,996 48	280 16
5	Second	1344	2044	1	3,389	397	23	18,239 96	358 62	89 08
	Sixth..	805	4063	1	4,869	137	11	19,754 04	785 26	76 48
	Total	2149	6107	2	8,258	534	34	37,994 00	1,143 88	165 56
6	Tenth.	507	5031	3	5,541	70	31	23,595 46	986 60	213 96
	Fourteenth.	247	3916	16	4,179	296	27	17,759 66	1,649 04	62 02
	Total	754	8947	19	9,720	366	58	41,355 12	2,635 64	275 98
7	Fourth.	925	3606	4	4,535	288	25	21,632 58	1,706 24	81 20
	Twel'th	295	4484	....	4,779	301	17	19,844 58	1,735 86	81 24
	Total	1220	8090	4	9,314	589	42	41,477 16	3,442 10	162 44
8	Eighth.	521	4399	3	4,923	85	13	21,696 94	1,355 18	161 96
	Sixteenth.	340	6306	20	6,666	622	18	25,499 04	2,443 54	209 44
	Total	861	10705	23	11,589	707	31	47,195 98	3,798 72	371 40
9	Eighteenth.	76	3588	502	4166	463	12	15,087 54	4,502 50	102 28
	Grand Total	10078	~~[illegible]~~ 77293	597	87,968	6,326	406	$362,115 84	$32,107 81	$2,778 82

RECEIPTS OF WATER RATES BY DISTRICTS,

From July 1st, 1906, to July 1st, 1907.

YEARS	First District Wards 9, 15 and 17	Second District Wards 11 and 13	Third District Wards 1 and 7	Fourth District Wards 3 and 5	Fifth District Wards 2 and 6	Sixth District Wards 10 and 14	Seventh District Wards 4 and 12	Eighth District Wards 8 and 16	Ninth District Ward 18	Meters	Total
1889-90	....	....	....	....	....	$ 1 00	....	....	....	....	$ 1 00
1893-94	....	....	....	$ 5 40	....	....	....	....	....	....	5 40
1902-03	....	$ 3 20	....	....	$ 2 35	....	....	....	....	....	5 55
1903-04	....	5 45	$ 1 30	80	4 00	....	....	....	....	....	11 55
1904-05	$ 5 05	5 20	5 10	3 95	7 67	....	....	$ 2 32	....	....	29 29
1905-06	1,294 36	406 07	811 20	950 94	981 32	752 72	$ 849 29	946 19	$ 192 44	....	7,184 53
1906-07	59,649 75	36,495 76	35,709 58	35,928 62	36,802 45	40,044 78	39,076 92	44,131 50	12,343 62	$ 201,544 90	541,727 83
Total.	$60,949 16	$36,915 68	$36,527 18	$36,889 71	$37,797 79	$40,798 50	$39,926 21	$45,080 01	$12,536 06	$ 201,544 90	$ 548,965 15

Estimated Valuation of Works

Real Estate	$ 473,958 60
Buildings, docks, basins, tunnel and crib, engines, etc., at pumping station	2,683,963 60
Water Pipe in use	5,054,191 00
Office furniture and fixtures	13,621 30
Meters in use	118,606 44
Tools and materials on hand:	
In office of Civil Engineer	26,189 84
In office of Superintendent of Construction	655 26
In Inspection Department	161 97
In Meter Department	3,485 26
In Pumping Works Department	14,425 24
In Hurlbut Fund Department	2,351 59
In Service Connection Department	3,344 39
At Storage Yards	99,881 11
	$8,494,830 60

The amount expended for the Pumping Works to July 1st, 1907.

	Previously Expended.	July, 1907.	Total.
Land	$59,488 29	$11,125 00	$70,613 29
Force Mains	624,058 03	....	624,058 03
Inlet Pipe	104,257 36	....	104,257 36
Docks, Basins and Canal	152,923 86	12,079 37	165,003 23
Conduits and Wells	310,446 77	....	310,446 77
Engine, Boiler, Coal Houses and Chimney	341,809 87	7,652 03	349,461 90
Stand Pipe and Tower	31,674 25	150 00	31,824 25
Pump Wells	54,221 56	....	54,221 56
Engines	645,119 70	5,593 89	650,713 59
Boilers	107,444 44	14,112 11	121,556 55
Engineer's House	8,415 93	7 95	8,423 88
Sewers	6,666 25	....	6,666 25
Electric Light Plant	3,187 40	40 97	3,178 37
Inspection	7,512 54	....	7,512 54
New Gallery	8,249 10	....	8,249 10
Traveling Crane and Coal Cars	2,590 00	....	2,590 00
Grounds, Fences and Gateway	193,114 89	9,201 63	202,316 52
Library, Greenhouse and Belvedere	36,014 81	573 28	36,588 09
Tunnel and Crib	200,620 94	....	200,620 94
Miscellaneous	22,969 56	736 42	23,705 98
Totals	$2,920,735 55	$ 61,272 65	$2,982,008 20

Water Works Bonds.

The following table shows the whole history of the bonded indebtedness of the Board, in which it will be seen that the total amount of bonds issued is $2,800,000, of which $1,850,000 have been redeemed or refunded, leaving outstanding $950,000.

The $100,000.00 seven per cent. bonds which matured September, 1899, and $100,000.00 seven per cent. bonds which matured February 1st, 1900, were on the latter date refunded at three and one-half per cent. $100,000.00 of the $250,000.00 seven per cent bonds which matured August 1st, 1904, were refunded at 4 per cent.

No. of Issue.	Act of	Issued.	Payable.	Amount.	Rate of Interest	Redeemed or Refunded	Outstanding.
1st	1853	Aug. 1, 1853	Aug. 1, 1883	$100,000	7cts.	$100,000	....
“	“	“ “	Aug. 1, 1878	100,000	7 “	100,000	....
“	“	“ “	Aug. 1, 1873	50,000	7 “	50,000	....
2nd	1855	Aug. 1, 1855	Aug. 1, 1890	100,000	7 “	100,000	....
“	“	June 12, 1855	Aug. 1, 1885	100.000	7 “	100,000	....
“	“	“ “	Aug. 1, 1880	50,000	7 “	50,000	....
3rd	1857	Aug. 1, 1858	Aug. 1, 1893	150,000	7 “	150,000	....
“	“	Aug. 1, 1867	Aug. 1, 1887	100,000	7 “	100,000	....
* 4th	1869	Feb. 1, 1870	Feb. 1, 1900	100,000	7 “	100,000	....
5th	“	Aug. 1, 1872	Aug. 1, 1902	50,000	7 “	50,000	....
6th	“	Aug. 1, 1873	Aug. 1, 1903	50,000	7 “	50,000	....
“	1873	Feb. 1, 1874	Feb. 1, 1904	50,000	7 “	50,000	....
7th	1869	Aug. 1, 1874	Aug. 1, 1904	50,000	7 “	50,000	....
“	1873	“ “	“ “	200,000	7 “	200,000	....
“	“	June 1, 1875	June 1, 1905	150,000	7 “	150,000	....
“	“	June 1, 1876	June 1, 1906	200,000	6 “	200,000	....
* “	“	Sept. 1, 1880	Sept. 1, 1899	100,000	4 “	100,000	....
“	“	April 1, 1881	April 1, 1897	100,000	4 “	100,000	....
“	“	Dec. 1, 1881	Dec. 1, 1896	50,000	4 “	50,000	....
“	“	Jan. 10, 1895	Jan. 10, 1925	100,000	4 “	....	100,000
*Refund	1869 1873	Feb. 1, 1900	Feb. 1, 1930	200,000	3½“	....	200,000
	1873	Jan. 1, 1903	Jan. 1, 1933	50,000	3½“	....	50,000
	1901	Sept. 1, 1903	Sept. 1, 1933	150,000	3½“	....	150,000
	“	June 1, 1904	June 1, 1934	200,000	3½“	....	200,000
Refund	1873 1901	Aug. 1, 1904	Aug. 1, 1919	100,000	4 “	....	100,000
	1901	Feb. 1, 1905	Feb. 1, 1935	150,000	3½“	....	150,000
				$2,800,000		$1,850,000	$950,000

Respectfully submitted,
BENJ. F. GUINEY,
Secretary.

REPORT OF THE GENERAL MANAGER.

Detroit, Mich., July 1, 1907.

To the Board of Water Commissioners of the City of Detroit:

GENTLEMEN—I respectfully submit a report of the general operations of the works for the year ending June 30th, 1907.

The assessment rolls of water rates show a gain over the previous year of $32,107.81. During the year, places on the assessment rolls, with a total assessment of $2,778.82, were transferred to the meter rolls.

The increase of families on assessment rolls for the same period was 6,326. The increase of 1,289 families in the 17th ward was largely due to the annexation of Fairview Village. The details of the number of families assessed in each ward and district, vacant tenements, number of families not assessed and increase of assessment by wards will be found by reference to the table of assessments in the report of the Secretary.

The total number of gallons pumped during the year was 25,118,295,041, of which 92,582,400 gallons were supplied to the Village of Hamtramack; 77,764,324 to the Village of River Rouge, 45,417,812 gallons to the Village of Highland Park, 5,580,800 to the Village of Ecorse, and 51,627,708 gallons to the Village of Fairview.

The excess of pumpage over the previous year was 2,712,982,937. The average daily consumption (including villages), was 68,817,247 gallons, an average daily increase of 7,460,228 gallons.

The highest day's pumping was 91,841,900 gallons, on February 2, 1907, and the lowest was 53,118,910 gallons on November 25th, 1906.

The amount received for metered water was $202,338.31, of which amount the Village of Highland Park paid $2,052.40; the Village of River Rouge, $3,508.02; the Village of Ecorse, $259.70; the Village of Hamtramck, $4,175.68, and the Village of Fairview, $2,024.76.

Storage Grounds.

The grounds and buildings are in good condition. A large amount of repairs was necessary to put the residence of the Superintendent of Construction in habitable condition. The plumbing and drainage was entirely overhauled, and the necessary papering, painting, etc., done. The exterior will require painting the coming season, as will also the cottages occupied by the emergency men on Erskine street, and the fences surrounding both yards. The condition of Orleans street is very bad in rainy weather, and it should be paved.

Pumping Station.

A large amount of grading and sodding has been done during the season and the main roads re-graveled, putting them in very good condition. The re-building and re-pairing of the dock at end of canal has been completed and the channel of the canal has been dredged 30 feet wide, and 15 feet deep from draw bridge to end of pier. The bank of canal from the dock to draw bridge has been graded and the water edge paved with cobble. Both banks from draw bridge to Belvidere are under-going the same improvements.

The artificial lakes in front of Engine House have been concreted and bordered with screened gravel.

But little improvement has been made to "Edward's Addition," except on its Jefferson Avenue front, where the proper grading and sodding from curb line to street line has been done. The three old cottages on Edward's Lane have been sold and removed.

The repairs to foundation under Engine No. 2 were completed and engine put in commission March 8th, 1907. The three 333-1/3 horse-power tubilar boilers with stokers, reported in the last report as ready for test, have been tested, accepted and are in use.

An emergency gang has been maintained at the station during the summer as a precautionery measure in case of breaks in large mains in that locality, and will remain there until completion of emergency house now being built on Fisher Avenue, near Jefferson.

The following Table shows the amount of water pumped each year from 1852 to 1907.

YEARS.	FAMILIES SUPPLIED.	WATER PUMPED.	
		TOTAL QUANTITY.	PER FAMILY.
1852	......	235,840,275	......
1853	4,283	303,531,743	70,868
1854	4,619	376,265,126	81,460
1855	5,282	542,807,364	102,765
1856	5,706	692,124,305	121,297
1857	6,189	697,190,523	112,650
1858	6,474	718,091,207	110,919
1859	6,794	782,112,587	115,118
1860	6,750	870,036,451	125,185
1861	7,128	895,129,423	125,579
1862	7,275	994,945,329	136,762
1863	7,699	1,035,798,043	134,534
1864	7,993	1,019,390,256	127,410
1865	8,351	1,040,514,887	125,675
1866	9,089	1,196,317,922	131,622
1867	10,242	1,425,535,230	139,186
1868	11,544	1,666,545,125	144,364
1869	12,774	1,946,810,325	152,400
1870	13,722	1,866,060,068	136,000
1871	14,896	2,300,150,605	154,414
1872	16,035	2,782,292,578	173,513
1873	17,019	3,198,393,948	187,930
1874	18,853	3,289,872,635	174,511
1875	19,606	4,207,454,260	214,600
1876	20,102	4,065,134,470	200,225
1877	20,345	4,213,239,790	207,090
1878	20,603	4,345,743.330	210,927
1879	21,341	5,129,599,110	240,348
1880	22,465	5,552,965,310	247,183
1881	23,749	6,543,127,968	279,722
1882	25,442	6,284,000,742	243,062
1883	27,415	7,379,327,788	269,170
1884	29,424	8,510,614,140	289,260
1885	30,533	9,970,829,580	326,886
1886	31,946	10,576,571,254	331,070
1887	34,486	13,168,859,808	381,860
1888	36,863	14,380,166,670	390,098
1889	39,158	12,875,334,453	328,880
1890	41,467	12,120,944,532	292,300
1891	43,933	12,057,261,236	274,470
1892	46,400	12,276,612,482	264,582
1893	49,817	13,877,977,208	278,579
1894	49,912	13,649,779,605	273,476
1895	51,426	14,698,451,954	285,818
1896	53,941	13,254,369,371	245,719
1897	54,945	12,928,821,326	235,305
1898	56,341	14,278,682,058	253,433
1899	58,931	16,348,062,701	277,410
1900	60,524	17,077,100,477	282,154
July, 1901 to July, 1902	64,718	18,333,104,706	283,320
July, 1902 to July, 1903	67,280	18,757,682,360	275,440
July, 1903 to July, 1904	70,087	21,734,954,234	* 305,131
July, 1904 to July, 1905	73,293	21,977,576,875	* 294,247
July, 1905 to July, 1906	80,848	22,395 312,104	* 271,607
July, 1906 to July, 1907	87,371	25,118,295.041	* 284,023

*272,973,044 gallons delivered outside Detroit; deducted from total pumped.

Pipeage System

You are respectfully referred to the report of the Superintendent of Construction for details of the work in this department during the year.

A large amount of pipe for increased fire protection was laid during the year, the most important extensions being the following:

Beaufait, Mack to Kercheval, 3545 feet 10 inches; Berlin, Beaufait to Bellevue, 388 feet 10 inches; Kercheval, Belt Line to Bellevue, 243 feet 8 inches; St. Antoine, Kirby to Farnsworth, 688 feet 8 inches; Macomb, Orleans to St. Aubin, 1050 feet 10 inches; St. Aubin, Macomb to Champlain, 658 feet 10 inches; 19th St., Fort to Howard, 945 feet 10 inches; Lafayette, 19th St. to 18th St., 425 feet 8 inches; Stanley, Wabash to Grand River, 2984 feet 12 inches; Grand River, Stanley to W. Boulevard, 3068 feet 12 inches; Bellevue, north of Jefferson, 624 feet 12 inches; West Gd. Boulevard, Scovel to Moore, 694 feet 8 inches; 3rd St., Antoinette to Amsterdam, 1166 feet 10 inches.

A 42 inch main, extending on Fort, Campau, and Jefferson Avenue west, from Vinewood to Artillery, is under construction.

All gates were examined, repairs made where necessary, and dead ends regularly blown off.

The total mileage of the distribution system July 1st, 1907, was 709 miles and 3192 feet, of which 652 miles and 1032 feet are within the city and 59 miles and 2160 feet in the adjoining villages. Twenty-nine miles and 4627 feet were laid during the year and 16160 feet discontinued or replaced by larger sizes, making a net increase of 26 miles and 4307 feet, of which 16531 feet were laid in the Village of St. Clair Heights; 425 feet in the Village of Ecorse;

2401 feet in the Village of Hamtramck; 6632 feet in the Village of Highland Park; *28941 feet in the Village of Fairview.

*Prior to annexation.

The following is the report of the Board of Health of examination of the water supply for the month of June, 1907:

Taken from Laboratory Tap.	Parts Per Million.
Appearance—Nearly Clear.	
Temperature	18.8 C°
Total solids	118,000
Volatile matter	44,000
Non-volatile matter	74,000
Free ammonia	.020
Albuminoid ammonia	.082
Nitrogen as nitrates	.116
Nitrogen as nitrites	None
Chlorine	4,600
Oxygen absorbed in 15 minutes	.56
Oxygen absorbed in 4 hours	.96
Bacteria per cubic centimeter	287
Bacteria per cubic centimeter	234
Bacteria per cubic centimeter	179
Bacteria per cubic centimeter	208

Animal inoculations, 2—both recovered.

Conclusion: Water is in satisfactory condition.

Respectfully submitted,

E. H. HAYWARD,
Analyst and Bacteriologist.

All of which is respectfully submitted,

H. S. STARKEY,
General Manager.

REPORT OF THE CIVIL ENGINEER

Detroit, Mich., July 1, 1907.

To the Board of Water Commissioners of the City of Detroit:

GENTLEMEN—I have the honor to submit the following Annual Report of the Civil Engineer for the year ending June 30, 1907:

Population

The City Limits have again been extended by the State Legislature at several points. The most important addition to the City being a portion of the Village of Fairview containing about 400 families. The total number of families included in the June census of the Board is 87,968. This count includes 597 families inside the limits which do not take water; also 315 families which are supplied outside the limits. The villages are not included in the count of families. Allowing 4.618 persons per family for the City and 5.25 persons per tap for the Villages, the estimated population supplied is as follows:

PLACE	NUMBER	ESTIMATED POPULATION ACTUALLY SUPPLIED
Detroit..............	87,371 fam. at 4.618	403,479
Highland Park....	361 taps " 5.250	1,895
River Rouge......	713 " " "	3,743
Ecorse............	148 " " "	777
Hamtramck.......	556 " " "	2,919
	Total...	412,813

The estimated population actually inside the present city limits is estimated at 87,653 families at 4.618 persons per family, equals 404,782.

Consumption

The daily per capita consumption of water is given in the following table:

CORPORATION SUPPLIED.	U. S. GALLONS SUPPLIED July 1, 1906 to June 30, 1907, inclusive.		Estimated Number of Persons supplied.	Gallons per Capita Daily.	
	Total.	Daily Average.		1906-7	1905-6
Detroit, unmetered. ...	17,245,799,825	47,248,767	403, 479	169.1	162.4
Detroit, metered.......	7,651,149,880	20,962,054			
Highland Park, metered	45,417,812	124,432	1,895	65 7	61.4
River Rouge, metered..	77,764,324	213,053	3,743	57.0	43.6
Ecorse, metered........	5,580 800	15,290	777	19.7	23.4
Hamtramck, metered...	92,582,400	253,650	2,919	86.9	73.9
TOTALS.........	25,118,295,041	68,817,247	412,813	166.7	159.9

The estimated increase in the total number of persons supplied is 29,116, and the per capita consumption is 166.7 gallons per day compared with 159.9 for the preceding year.

The maximum, minimum and average daily quantity of water supplied to the high and to the low pressure system is as follows:

High Pressure System.	Gallons
Maximum day Feb. 11, 1907..........	19,252,500
Minimum day Nov. 25, 1906..........	9,585,000
Average daily	13,421,182
Total for year	4,898,731,500
Low Pressure System.	
Maximum day Feb. 12, 1907..........	74,696,900
Minimum day May 5, 1907..........	42,829,685
Average daily	55,396,067
Total for year	20,219,563,541

Combined System.

Maximum day Feb. 12, 1907	91,841,900
Minimum day Nov. 11, 1907	53,118,710
Average daily	68,817,247
Total for year	25,118,295,041
Maximum hour, 12 to 1 P. M. Sept. 12th, 1906	4,516,040
Minimum hour 3 to 4 A. M. Oct 31st, 1906	1,759,305

The average number of gallons pumped in the combined system has increased from 61,357,019 gallons per day to 68,817,247 gallons per day, which is equivalent to 12 per cent.

The precipitation, temperature and daily consumption is graphically shown on the accompanying plates.

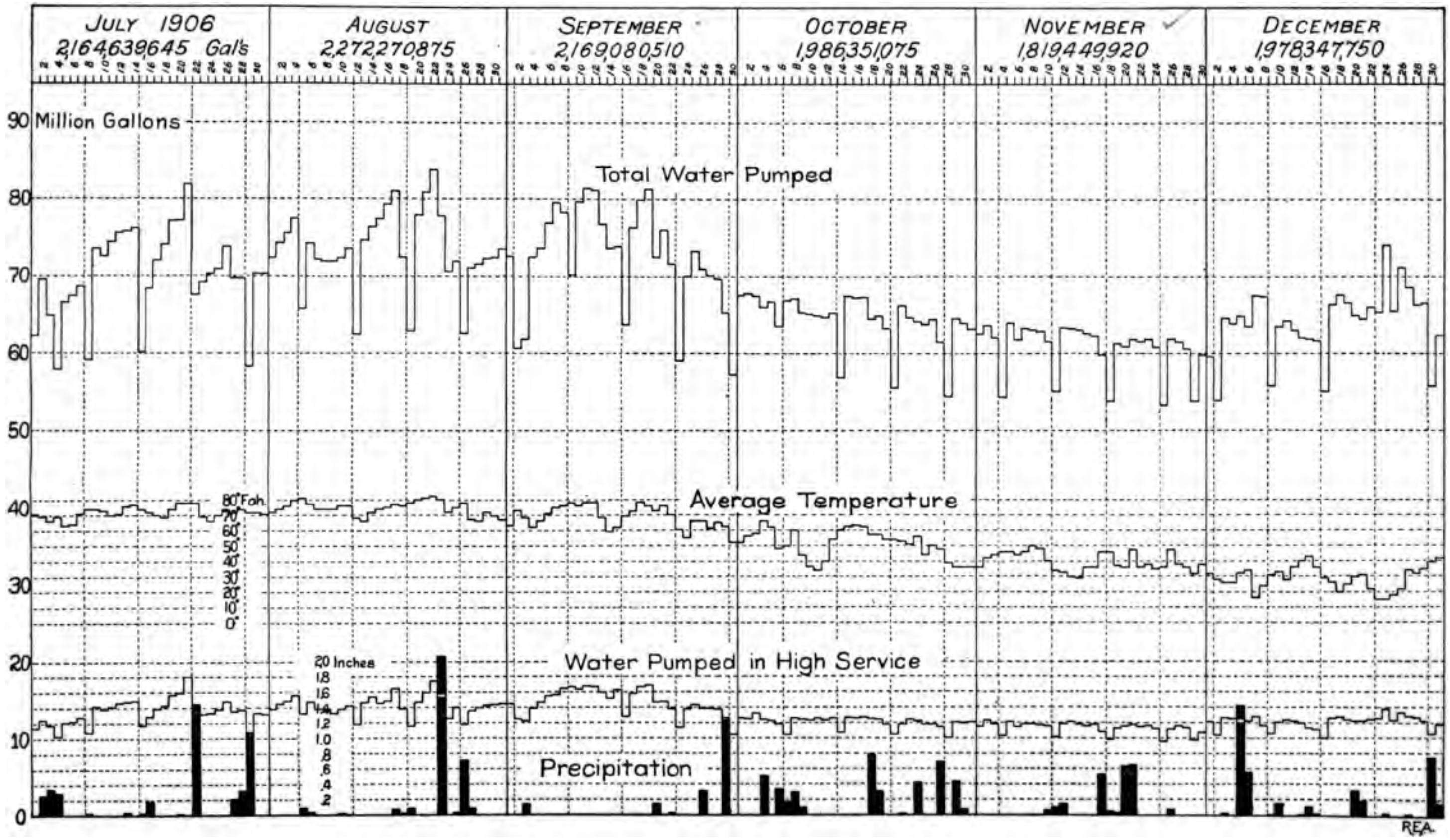
Pressures

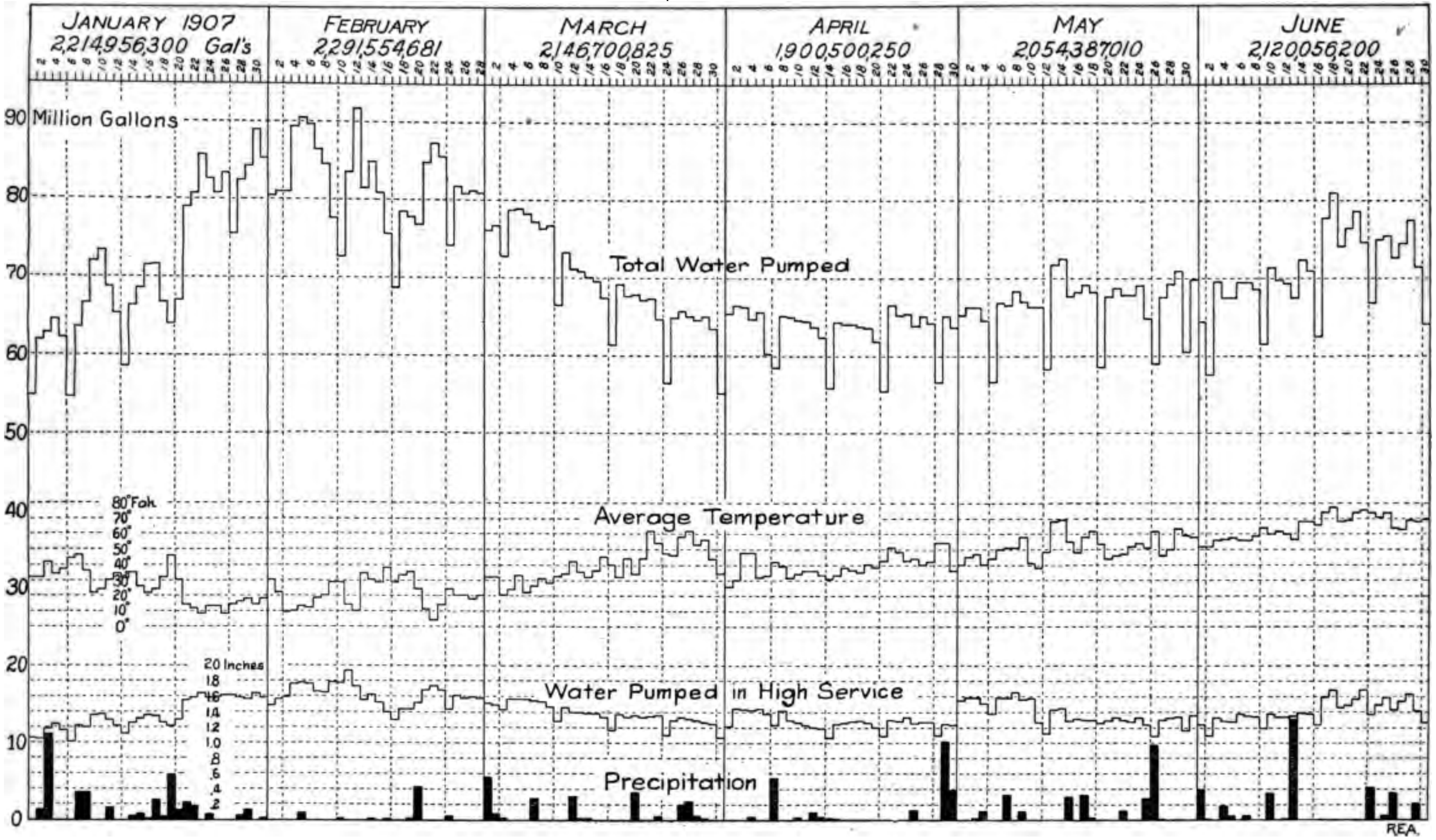
The frictional loss throughout the City has increased at every point on account of the increased quantity of water used. The greatest increase in friction was at Engine House No. 27, and the least was at Engine House No. 7. The pressure at the Pumping Station has averaged about one and a quarter pounds higher on the low system and two and a half pounds on the high system in order to overcome the increased friction.

The lowest average pressure was 17.36 pounds at the Storage Yard and the highest was 38.39 pounds at Engine House No. 18.

The pressures at all gauge points are given in detail in the accompanying table.

DAILY WATER CONSUMPTION, AVERAGE TEMPERATURE AND PRECIPITATION




JANUARY 1907
2,214,956,300 Gal's
FEBRUARY
2,291,554,681
MARCH
2,146,700,825
APRIL
1,900,500,250
MAY
2,054,387,010
JUNE
2,120,056,200
90 Million Gallons
80
70
60
50
40
30
20
10
0
80° Fah.
70°
60°
50°
40°
30°
20°
10°
0°
20 Inches
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2
Total Water Pumped
Average Temperature
Water Pumped in High Service
Precipitation
REA.

	LOCATION OF GAUGES.	Elevation above City datum.	Elevat'n pounds above surface pump wells 92.00 at which engine gauges are set	AVERAGE DAILY GALLONS 61,357,019 . JULY 1, 1905 TO JUNE 30, 1906				AVERAGE DAILY GALLONS 68,817,247 JULY 1,1906 TO JUNE 30,1907				Increase or Decrease Friction during last year		Maximum hour observed Sept. 12, 1906. 4,516,040 Gals 12 to 1 a. m. Daily Rate 108,384,960 Gals.		Minimum hour observed Feb. 12, 1907 4,508,060 Gals 9 to 10 a. m. Daily Rate 108,193,440 Gals.	
				PRESSURES, POUNDS.			Fric. Loss, Lbs.	PRESSURES, POUNDS.			Fric. Loss, Lbs.	Pounds		Average Pressure Lbs.	Fric. Loss, Lbs.	Average Pressure Lbs.	Fric. Loss Lbs.
		Feet.		High.	Low.	Mean. 8760 read.		High.	Low.	Mean. 8760 read.		Inc.	Dec.				
Low Service	Pumping Station,	92.00	....	60	42	52.11	.....	61	45	53.34	....	......	......	59.75	....	58 75	....
	Engine No. 26, Crane and Brinket	125.787	14.62	47	28	35.79	1.70	46	29	36.57	2.15	0.45	......	43.50	1.63	41.00	3.13
	Engine No. 7, Concord near Jefferson	124.773	14.19	42	27	35.27	2.65	43	28	36.39	2.76	0.11	......	40.00	5.56	39 00	5.56
	Truck No. 6, Elmwood and Fort.	124.495	14.07	38	24	30.10	7.94	37	22	30 69	8 58	0.64	......	34.00	11.08	30.00	14.68
	Engine No. 19, Congress near Jos. Campau	122.473	13.19	..	*..	.....	.....	37	27	32.49	7.66	......	......	.....	.....	.....	.....
	Engine No 2, Hastings near Congress	120 981	12.55	36	25	30.72	8.84	36	22	29.42	11.37	2.53	......	27.50	19.70	28 50	17.70
	Water Office, Randolph and Jefferson	125.176	14.36	33	23	28.30	9.45	34	24	28.22	10.76	1.31	......	27.50	17.99	26.00	18.39
	Truck No. 1, Wayne and Larned.	116.738	10.70	36	24	30.78	10.63	37	24	30.74	11.89	1.26	......	28.50	20.55	27 00	21.05
	Engine No. 3, Griswold and Clifford	123.059	13 44	37	24	30.13	8.58	38	25	29.73	10.17	1 59	......	28.00	18.31	28.50	16.81
	Engine No. 8, Sixth and Baker	122.144	13.05	34	22	28.66	10.40	36	23	28.43	11.86	1.46	......	26.00	20.70	26.50	19.20
	Engine No. 4, Eighteenth near Howard	116.179	10.47	36	24	30.51	11.13	37	25	30.01	12.86	0.27	......	27.50	21.78	26.00	22.28
	Truck No. 4, Twentieth near Rose	124 825	14.21	33	20	26.90	11.00	34	18	26.52	12 61	1.61	......	23.00	22.54	22 00	22.54
	Engine No. 10, Sixteenth and Bagg	125.282	14.41	35	21	27.70	10.00	36	21	26.98	11.95	1.95	......	24.50	20.84	23 00	21 34
	Engine No. 15, Hubbard near Fort	114.617	9.79	37	22	31.10	11.22	38	22	30 43	13.12	1.90	......	26.00	23.96	27.00	21.96
	Engine No. 29, Solvay and Jefferson W.	115.052	9.98	..	**..	.....	.....	31	13	23.34	20.02	......	......	.....	.....	.....	.....
	Engine No. 27, Junction and Rogers	113.736	9.41	39	23	31.58	11 12	39	21	29.95	13.98	2.86	......	25.00	25.34	24.50	24.84
	Engine No. 14, Scotten near Michigan	121.369	12.71	34	21	28.33	11.07	37	21	28.24	12 39	1.32	......	24.00	23.04	22 50	23.54
	Engine No. 22, Michigan near Hammond	119.444	11.88	35	20	27.70	12.53	35	18	26.50	14.96	2.43	......	22.00	25.87	20.50	26.37
	Truck No. 10. Sheridan and Mack	140.254	20.89	37	20	27.96	3.26	37	19	28.65	8.80	0.54	......	33.00	5.86	32.00	5.86
	Engine No. 18, Mt. Elliott near Sylvester	146.233	23.48	34	19	25.07	3.56	33	17	25.55	4.33	0.77	......	29.50	6.77	27.50	7.77
	Engine No. 11, Grandy and Gratiot	143.211	22.17	31	20	25.50	4.44	32	20	25.91	5.26	0.82	......	28.00	9.58	26.00	13.58
	Engine No. 6, High near Hastings	142.631	21.92	28	15	20 68	9.51	29	16	20.65	10.77	1.26	......	19.00	18.83	19.00	16.83
	Storage Yard, Erskine near Riopelle	150.635	25.38	25	12	18 43	8.30	24	12	17.36	9.17	0.87	......	16 50	17.87	15.00	18.37
	Truck No. 5, Russell and Erskine	147.742	24.13	25	12	19.00	8.98	25	13	19.27	9.94	0.96	......	19.00	16.62	18.50	16.12
	Engine No. 5, Alexandrine near Cass	146 693	23.68	25	13	18.91	9.52	25	13	18.61	11.05	1.53	......	16.50	19.57	17.50	17.57
	Engine No. 12, Sixteenth and Grand River.	141.546	21.45	27	14	20.30	10 36	28	15	19.97	11.92	1.56	......	18.00	20.30	16.00	21.30
	Engine No. 20, Baldwin and Gratiot	145.368	23.10	34	18	26.31	2 70	35	17	26.94	3.30	0.60	......	31.50	5.15	30.50	5.15
High Service.	Pumping Station,	92 00	.....	83	53	62.13	....	85	53	64.67	....	.....	......	75.00	....	74.00	....
	Engine No. 18, Mt. Elliott near Sylvester	146.233	23.48	49	25	36.07	2.58	60	31	38 39	2.80	0.22	......	44.00	7.52	42.00	8.52
	Engine No. 23, Moran and Boulevard	154.288	26.96	43	23	30.70	4.47	47	20	31.69	6.02	1.55	......	35.00	13 04	35.50	11.54
	Engine No. 28, Riopelle and Milwaukee	155.556	27 52	34	23	28.71	5.90	45	18	29 30	7.86	1.96	......	28.50	18.98	30.00	16.48
	Engine No. 13, Russell and Ferry	157.304	28.27	42	17	29.84	4 02	46	20	30.73	5 67	1.65	......	29.50	17.23	32.00	13.73
	Engine No. 17, Cass near Amsterdam	152.825	26.33	42	21	29.71	6.09	46	21	30 23	8.11	2.02	......	28.50	20.17	30.50	17.17
	Engine No. 21, Lincoln near Piquette	154.880	27.22	42	14	20.24	4.67	42	20	30.54	6.91	2.24	.....	28.50	19.28	29.00	17.78
	Engine No. 24, Mott near John R.	155.855	27.64	39	17	28.39	6.10	39	19	28 82	8.21	2.11	......	25.50	21 86	28.50	17.86

* Engine No. 19 Gage put in service April 9, 1907 ** Engine No. 29 Gage put in service June 4, 1907

42 inch Extension

The most important work under way is the extension of the 42-inch line on Fort Street, Campau and Jefferson Avenue W., from Vinewood to Artillery Avenue, a total distance of 7590 feet. The estimated cost of this extension is about two hundred thousand dollars.

Fire Lines

The inspection of fire lines was given to this Department during the year and the work connected with this added duty has been considerable. There are 105 such plants and with a few exceptions they have been made to comply with the rules of the Board. It is hoped at an early date to complete the list.

Emergency Station

To prevent if possible the re-occurrence of breaks in the large force mains near the Pumping Station, an emergency station has been authorized. The station is located at Fischer, north of Jefferson and will contain an air chamber having a capacity of 1000 cubic feet. The emergency men now temporarily located at the Pumping Station will have permanent quarters in the new building.

Summary of Statistics

Attached find a summary of statistics in the form recommended by the New England Water Works Association, which is very convenient in making comparison with other cities. This summary has been compiled jointly by the Secretary and Engineer from information obtained from all departments.

Respectfully submitted,

CLARENCE W. HUBBELL,

Civil Engineer.

SUMMARY OF STATISTICS

For the year ending June 30th, 1907

In form recommended by the New England Water Works Association.

Detroit, Mich., Water Works, Detroit, Wayne County, Michigan.

General Statistics.

Population by U. S. Census, of 1900, 285,704.
Date of construction, 1827, to date.
By whom owned, The Board of Water Commissioners of the City of Detroit.
Source of supply, Detroit River.
Mode of supply (whether gravity or pumping), pumping.

Pumping Statistics.

1. Builders of Pumping Machinery, 3 Triple Allis, 3 Compound, Local.
2. Description of fuel used
    - *a.* Kind, bituminous, run of mine.
    - *b.* Brand of coal, Meadowbrook.
    - *c.* Average price of coal per gross ton delivered, $2.38
    - *d.* Percentage of ash, 7.5.
    - *e.* Wood, price per cord, $—none.
3. Coal consumed for the year, 31,355,044 lbs.
4. [Pounds of wood consumed] ÷ 3 = equivalent amount of coal. No record. None used except small quantity for starting fires.

4*a*. Amount of other fuel used, none.

5. Total equivalent coal consumed for the year = (3) + (4), 31,355,044 lbs.
6. Total pumping for the year,
    High 4,898,731,500
    Low 20,219,563 541
    Total 25,118 295,041
    gallons, with an allowance of 1 % for slip.
7. Average static head against which pumps work. Direct pressure. No reservoir.
8. Average dynamic head against which pumps work.... High, 64.67 lbs. = 149.4 ft.; Low 53.34 lbs. = 123.2 ft. } 130.73 ft.
9. Number of gallons pumped per pound of equivalent coal (5), 801.1.
10. Duty = $\dfrac{\text{gallons pumped (6)} \times 8.34 \text{ (lbs.)} \times 100 \times \text{dynamic head (8)}}{\text{Total fuel consumed (5)}}$ = 87,342,185

Cost of pumping, figured on pumping station expenses, viz., $79,412.80.

11. Per million gallons pumped, $3.16.
12. Per million gallons raised one foot (dynamic), $0.0242.

Financial Statistics.

RECEIPTS.

Balance brought forward		$ 46,035.74
(*a*) From ordinary (maintenance receipts)		700,511.98
	Total	$746,547.72

From Water Rates.

A.	Fixture rates	$347,420.25
B.	Meter rates	201,544.90
K.	From tax levy	75,000.00
M.	From other sources	76,546.83
N.	Total.	$700,511.98
	Balance forward	46,035.74
	Total	$746,547.72

EXPENDITURES.

Water Works Maintenance:

AA.	Operation (management and repairs)	$195,946.24	
CC.	Total maintenance		195,946.24
DD.	Interest on bonds		35,588.75
	(CC + DD)		231,534.99
EE.	Payment of bonds		16,000.00

Water Works Construction.

GG.	Extention of mains	342,619.49	
KK.	Total construction		342,619.49
L L.	Unclassified expenses: Loan % $75,000. Real estate $11,125. Hurlbut fd., $3,723.37		89,848.37
	Total		$680,002.85

MM. Balance:

(*aa*)	Ordinary	$ 2,704.75	
(*b b*)	Extraordinary	63,840.12	
	Total balance		$ 66,544.87
N.	Total		$746,547.72

Disposition of balance on hand:

O.	Net cost of works to date	$8,494,830.60
P.	Bonded debt at date	950,000.00
Q.	Value of sinking fund at date	31,122.41
R.	Average rate of interest, 3¼ + per cent.	

Statistics of Consumption of Water.

1. Estimated total populotion at date..........................419,000
2. Estimated population on lines of pipe.......................414,500
3. Estimated pepulation supplied.................... 412,838
4. Total consumption for the year................25,118,295,041 gallons
5. Passed through meters.... .. ..7,651,149,880 gallons
6. Percentage of consumption metered........................ 30.46%
7. Average daily consumption....................68,817,247 gallons
8. Gallons per day to each inhabitant........... .... 164.2
9. Gallons per day to each consumer.......................... 166 7
10. Gallons per day to each tap................................ 875
11. Cost of supplying water per million gallons, figured on total maintenance (item CC).................................. $ 7.80
12. Total cost of supplying water, per million gallons. figured on totat maintenance + interest on bonds................. $ 9.28

Statistics Relating to Distribution System.

Mains.

1. Kind of Pipe, cast iron.
2. Sizes, from 2 inch to 45 inches.
3. Extended, 157,747 feet during the year.
4. Discontinued, 16,160 feet during the year.
5. Total now in use, 709 $\frac{3192}{5280}$ miles.
6. Cost of repairs per mile, $8.52.
7. Number of leaks per mile, .127.
8. Length of pipes less than 4 inches in diameter, 12.6 miles.
9. Number of hydrants added during the year (public and private,) 291.
10. Number of hydrants (public and private) now in use, 4,646.
11. Number of stop gates added during year, 299.
12. Number of stop gates now in use, 8,238.
13. Number of stop gates smaller than 4 inch, 33.
14. Number of blow offs, about 800.
15. Range of pressure on mains, 12 lbs. to 60 lbs.

Services.

16. Kind of pipe, lead, cast iron and galvanized iron.
17. Sizes, $\frac{5}{8}$ inch to 10 inch.
18. Extended......feet. No record.
19. Discontinued......feet. No record.
20. Total now in use,........miles. No record.
21. Number of service taps added during year, 5,412.
22. Number now in use, 78,633.

23. Average length of service,......feet. No record.
24. Average cost of service for the year. No record. Put in by plumber
25. Number of meters added, 635.
26. Number now in use, 6,844.
27. Percentage of services metered, 8.7%.
28. Percentage of receipts from metered water (B + C), 36.7%.
29. Number of motors and elevators added,——
30. Number now in use, not over forty.

REPORT OF SUPERINTENDENT OF METERS AND INSPECTION.

Detroit, July 1, 1907.

To the Board of Water Commissioners:

Gentlemen—In compliance with the rules and regulations of your honorable body, I herewith report the work done in the Meter, Inspection and Service Cocks Departments from July 1, 1906, to July 1, 1907:

NUMBER OF METERS PLACED FROM JULY 1, 1906, TO JULY 1, 1907.

	SIZES.								
	⅝ in.	¾ in.	1 in.	1½ in.	2 in.	3 in.	4 in.	6 in.	Total
In service July 1, 1906	3,145	1,226	1,081	366	302	128	80	18	6,346
Placed during the year ending June 30, 1907	334	121	76	35	34	16	14	5	635
	3,479	1,347	1,157	401	336	144	94	23	6,981
Removed during the year ending June 30, 1907	60	14	30	9	12	5	5	2	137
Total number in service July 1st, 1907	3,419	1,333	1,127	392	324	139	89	21	6,844

IN SERVICE JULY 1, 1907.

KIND.	SIZES.								
	⅝ in.	¾ in.	1 in.	1½ in.	2 in.	3 in.	4 in.	6 in.	Total
Thomson	3,410	1,326	1,098	388	316	136	76	21	6,771
Crown	5	4	10	2	2	1	2	......	26
Hersey	1	1	16	2	4	......	6	......	28
Worthington	......	2	3	......	4	2	3	......	14
Union Rotary	1	......	......	......	......	......	1	......	2
Buffalo	1	......	......	......	......	......	......	......	1
Trident	1	......	......	......	......	......	......	......	1
Keystone	......	......	......	......	......	......	1	......	1
Aggregate	3,419	1,333	1,127	392	324	139	89	21	6,844

Indicators attached to hydraulic elevators.. 33

METERS IN STOCK JULY 1, 1907

KIND.	SIZES.								
	⅝ in.	¾ in.	1 in.	1½ in.	2 in.	3 in.	4 in.	6 in.	Total
Thomson	7	8	13	7	4	3	......	1	43
Crown	1	......	......	2	2	......	1	......	6
Hersey	......	......	9	......	1	......	1	......	11
Worthington	......	......	......	......	......	1	......	......	1
Total	8	8	22	9	7	4	2	1	61

Valuation of meters in stock July 1, 1907		$1,537 00
Valuation of material on hand July 1, 1907		855 79
Valuation of tools, etc., July 1, 1907		533 47
Valuation of horses, wagons, etc., July 1, 1907		454 00
Valuation of furniture, fixtures, etc., July 1, 1907		105 00
Total valuation of stock on hand July 1, 1907		$3,485 26

Valuation of meters in service July 1, 1906		$110,966 48
Deduct for meters sold	$ 541 95	
Deduct 2 per cent. for depreciation in value	2,219 33	2,761 28
		$108,205 20
Add amount expended for meters placed from July 1, 1906 to July 1, 1907		10,401 24
Total valuation of meters in service July 1, 1907		$118,606 44

SUMMARY OF TOTAL AMOUNT EXPENDED IN THE METER DEPARTMENT FOR THE YEARS 1889 TO JULY 1, 1907, INCLUSIVE.

	1889	1890	1891	1892	1893	TOTAL
Meters................	$11,175 00	$18,700 00	$6,501 55	$12,371 82	$6,987 43	$ 55,735 80
Supt. and labor........	1,734 10	8,510 57	4,841 49	8,269 17	8,980 46	32,335 81
Material, tools, etc....	637 26	2,982 14	872 99	2,132 93	1,650 33	8,275 65
Freight, hauling, etc..	98 05	408 97	197 11	244 08	165 12	1,113 33
Horses, wagon, etc....	....	....	....	547 24	184 50	731 74
Aggregate........	$13,644 41	$30,601 68	$12,418 14	$23,565 24	$17,967 86	$ 98,192 33

	1894	1895	1896	1897	1898	TOTAL
Meters................	$8,824 08	$9,235 11	$10,435 76	$7,955 97	$1,790 75	$ 38,241 67
Supt. and labor........	6,672 20	6,647 89	6,840 08	6,078 78	4,531 11	30,270 06
Material, tools, etc....	1,833 01	1,384 85	1,035 15	927 90	568 99	5,749 90
Freight, hauling, etc..	201 18	71 40	91 11	67 90	13 16	444 75
Horses, wagon, etc....	383 07	248 60	238 51	330 80	187 50	1,388 48
Aggregate.... ...	$17,913 54	$17,587 85	$18,140 61	$15,361.35	$7,091 51	$ 76,094 86

	1899	1900-1	1901-2	1902-3	1903-4	TOTAL
Meters................	$2,265 70	$4,172 61	$4,801 12	$ 4,316 72	$4,401 82	$ 19,957 97
Supt. and labor........	4,223 54	6,369 45	4,597 96	5,319 54	5,144 01	25,654 50
Material, tools, etc.....	375 32	617 71	521 69	577 61	360 45	2,452 78
Freight, hauling, etc..	6 85	15 00	1 60	3 37	59	27 41
Horses, wagon, etc....	244 25	321 15	220 10	238 00	473 30	1,496 80
Aggregate.........	$7,115 66	$11,495 92	$10,142 47	$10,455 24	$10,380 17	$49,589 46

	1904-5	1905-6	1906-7		Total Expended Since 1889.
Meters................	$5,238 75	$6,891 66	$10,065 13	....	$136,130 98
Supt. and Labor.......	5,171 79	5,043 62	5,086 09	....	103,561 87
Material, tools, etc....	271 09	196 67	336 11	....	17,282 20
Freight, hauling, etc..	1 80	....	7 80	....	1,595 09
Phone and Printing...	88 20	62 60	100 80	....	251 60
Horses, Wagon, etc...	275 50	234 50	86 95	....	4,213 97
Aggregate	$11,047 13	$12,429 05	$15,682 88		$263,035 71

Four hundred and ninety-eight (498) meters were installed during the past year, being two hundred and twenty-eight more than the previous year, and making the total number more in service 6844.

There are many places throughout the city where meters should be installed to stop waste, but with our present force, in this department, we are just about able to take care of the factories, business places, and those that are installed at the request of the consumer.

As an example of waste, will mention a case where we forced a meter on a house containing four families with the ordinary water fixtures, bath, closet, etc., the flat rate being $23.08 per year. The meter was set in October last and the first quarter's bill was $28.47, the following quarter $33.65, and the last quarter $9.85, making a total of $71.97 for the nine months. The owner has evidently concluded that it costs less to stop the waste than pay for it, as the last bill is considerably reduced. However, it is yet about three times as much as it should be.

Much of our time is also consumed in repairing meters, many of which have been in use over sixteen years. When they were first introduced here, ten years was supposed to be the life of a meter, but we find all that is required to make them last indefinitely is to repair the working parts or replace these with new, when necessary. The outer casing being composed of bronze, age does not injure them.

We are also handicapped with our transportation facilities. Meters are located in all parts of the City, and as far out Woodward Avenue as the State Fair Grounds, a distance of nearly ten miles, making an area of many miles in extent. To cover this territory with horse and wagon means a loss of much time. One or two small "auto trucks" could be used to good advantage.

Inspection.

The following shows a portion of the work done in the inspection department during the year ending June 30, 1907.

New connections examined—City	4,616
" " " Hamtramck	108
" " " Highland Park	116
" " " Fairview	124
Extensions examined	1,731
Buildings examined	9,353
Fixtures inspected	7,044
Let on new connections	3,780
Let on for building purposes	240
Let on vacancies, re-occupied	436
Let on non-payment	337
Building tax notices	5,120
Delinquents notified	22,476
Shut off for non-payment	436
Shut off for vacancy	596
Shut off for leaks	179
Inquiries for Assessors	7,455
Meters read	42,883
Meter bills delivered	23,500
Examination for leaks	20,651
Leaks reported	2,036
Total	153,217

Service Cocks.

Forty-seven hundred and forty (4740) service connections were made in the City during the past year and an additional 316 from the Village of Fairview were added, making 5056 in all. From this number must be deducted 162 connections that were abandoned, making a net increase of 4894, a gain of 36 per cent over the previous year.

The following tables show in detail the number, sizes, and wards in which they were made. Also the number and sizes of all service connections in the Villages of Highland Park, Ecorse, River Rouge, and Hamtramck.

Table showing the number and sizes of taps inserted, and those discontinued, in each ward from July 1, 1906, to July 1, 1907. Also those added by the annexation of the Village of Fairview.

INSERTED.	WARDS.																			
SIZES.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Add number from village of Fairview annexed May 1, 1907.	Total City
⅝-inch	71	35	180	124	107	32	57	72	178	82	127	215	249	192	201	319	843	624	270	3,978
1-inch	97	66	49	70	38	23	22	56	26	52	20	36	46	44	86	39	128	32	42	972
2-inch	8	2	3	1	3	3	3	5	1	3	...	..	...	1	3	8	5	...		51
3-inch	...	1	...	...	...	...	2	2	...	1	1	1	1	2	3	2	1	1		18
4-inch	...	2	1	1	...	...	...	...	...	...	...	...	...	2	2	...	2	1	2	13
6-inch	2	2	...	...	1	4	2	...	4	...	...	...	2	2	2	2	...	...		23
8-inch	...	...	...	...	...	..	1	...	...	...	...	..	...	...	...	...	..	...		1
Aggregate	178	108	233	196	149	62	87	135	209	138	148	252	298	249	297	370	979	658	316	5,056
DISCONTINUED.																				
⅝-inch	16	17	7	5	4	10	9	3	12	15	1	...	6	2		6	1	...	....	119
1-inch	5	8	...	3	1	1	...	...	1	3	...	...	2	1	7	10	1	...	....	43
Aggregate	21	25	7	8	5	11	9	3	13	18	1	...	8	3	12	16	2	...	....	162

Service connections in the villages of Highland Park, River Rouge, Ecorse and Hamtramck.

VILLAGES	IN USE JULY 1, 1906.						INSERTED IN 1907.					TOTAL.	TOTAL CONSUMPTION.
	5/8-in.	1-in.	2-in.	3-in.	4-in.	6-in.	5/8 in.	1-in.	2-in.	3-in.	4 in.		Gallons.
Highland Park....	161	81	1	1	.....	1	100	15	.....	1	.....	361	45,417,812
River Rouge.....	598	14	.....	.....	1	.....	92	7	.....	1	.....	713	77,764,324
Ecorse............	115	1	.....	.....	.....	.....	32	.....	.....	.....	.....	148	5,580,800
Hamtramck.......	426	18	1	.....	3	.....	100	6	.....	1	1	556	92,582,400
Aggregate.........	1,300	114	2	1	4	1	324	28	.....	3	1	1,778	221,345,336
											Consumption, Palmer Park		25,640,692

REPORT OF CHIEF ENGINEER AT PUMPING WORKS.

Detroit,. July 1, 1907.

To the Board of Water Commissioners:

Gentlemen—I have the honor to submit the Engineer's report for the year ending June 30, 1907.

The following table shows the number of gallons of water pumped, and cost of fuel for the years named:

YEAR.	GALLONS OF WATER PUMPED.	COST OF FUEL CONSUMED.	AVERAGE DAILY DELIVERED.
1852	235,840,271	....	646,411
1853	308,531,743	$ 2,129 37	931,594
1854	376,265,126	2,271 34	1,030,866
1855	542,807,364	3,325 81	1,487,143
1856	692,124,305	4,017 44	1,896,231
1857	697,190,523	3,993 20	1,909,837
1858	718,091,207	3,655 20	1,967,373
1859	782,112,587	3,194 15	2,142,774
1860	870,036,451	4,196 21	2,383,580
1861	895,129,423	4,414 07	2,452,409
1862	994,945,329	3.150 95	2,725,878
1863	1,035,798,043	4,670 86	2,837,808
1864	1,018,390,256	7,647 62	2,839,078
1865	1,049,514,887	7,372 89	2,875,383
1866	1,196,317,922	9,349 16	3,277,583
1867	1,425,535,230	10,121 82	3,905,576
1868	1,666,545,125	11,379 23	4,507,248
1869	1,946,810,325	11,247 92	4,511,809
1870	1,866,060,068	12.713 78	5,112,493
1871	2,300,150,605	14,681 05	6,301,782
1872	2,782,292,578	17.736 86	7,601,892
1873	3,198,393,948	20,233 30	8,762,723
1874	3,289,872,635	20,431 71	9,013,350
1875	4,207,454,260	21,393 98	11,527,272
1876	4,065,134,470	19,832 89	11,107,499
1877	4,213,239,790	17,433 72	11,543,123
1878	4,345,743,330	10,943 82	11,906,146
1879	5,129,599,110	11,219 51	14,053,696
1880	5,552,965,310	12,276 60	15,172,036
1881	6,543,127,968	16,556 63	17,926,377
1882	6,284,000,742	13,156 16	17,261,440
1883	7,379,327,188	16,495 99	20,217,334
1884	8,510,614,140	19,877 07	23,253,044
1885	9,970,829,580	21,341 48	27,317,341
1886	10,576,571,254,	20,387 24	28,976,907
1887	13,168,859,808	35,882 83	36,079,166
1888	14,380,166,670	39,568 66	39,397,716
1889	12,875,334,453	34,413 31	35,274,888
1890	12,120,944,532	31,852 40	33,209,067
1891	12,057,261,236	33,826 86	33,033,592
1892	12,476,612,482	31,034 40	34,182,499
1893	13,877,977,208	27,479 93	38,021,855
1894	13,649,779,605	29,283 47	37,396,656
1895	14,698,451,954	32,095 00	40,269,731
1896	13,254,369,371	31,186 17	36,215,123
1897	12,928,821,326	17,355 58	35,421,428
1898	14,278,682,058	17,880 19	39,092,252
1899	16.348,062,701	19,011 67	44,789,212
1900	17,077,100,477	25,398 50	46,786,576
January 1 to July 1, 1901	8,849,732,755	16,881 31	48,893,551
July 1, 1901, to July 1, 1902	18,333,104,706	24,830 79	50,200,204
July 1, 1902, to July 1, 1903	18,757,682,360	26,909 99	51,390,911
July 1, 1903, to July 1, 1904	21,734,954,234	38,461 08	59,385,121
July 1,1904, to July 1,1905	21,977,576,875	32,079 27	60,212,539
July 1,1905, to July 1,1906	22,395,312,104	29,394 17	61,357,019
July 1. 1906 to July 1, 1907	25,118.295.041	37,461 48	68.817.247

The following tables show in detail the work done by each engine each month of the year:

ENGINE No. 1.

MONTHS.	Time run. H.	Time run. M.	Revolutions.	Gallons Pumped.
July	528	30	337,505	445,123,610
August	143	25	87,130	124,582,620
September	396	05	247,770	328,744,920
October	434	20	261,215	337,003,830
November	12	00	7,400	9,626,400
December	145	15	86,040	83,233,200
January	390	55	227,190	309,475,290
February	366	30	230,295	314,076,120
March	......	....	....	....
April	43	05	18,345	14,419.170
May	242	30	159,010	206,294,880
June	328	20	238,720	317,996,880
Total	3,030	55	1,900,620	2,500,576,920

ENGINE No. 2.

July	......	....	....	....
August	......	....	....	....
September	......	....	....	....
October	......	....	....	....
November	......	....	....	....
December	......	....	....	....
January	......	....	....	....
February	......	....	....	....
March	446	00	257,925	307,653,120
April	660	05	350,165	439,042,080
May	125	55	82,570	113,768,760
June	102	25	68,515	76,611,120
Total	1,334	25	759,175	937,075,080

ENGINE No. 3.

July	322	35	337,505	298,497,270
August	452	25	270,395	422,608,900
September	482	50	249,945	366,054,390
October	53	15	36,640	33,488,960
November	257	00	172,215	157,404,510
December	204	45	123,700	113,061,800
January	316	35	213,430	331,310,810
February	379	15	238,499	329,907,606
March	465	20	172,160	337,956,720
April	311	55	188,995	241,619,070
May	9	30	5,845	5,342,330
June	8	15	4,845	4,428,330
Total	3,263	35	2,014,174	2,641,680,696

ENGINE No. 4.

MONTHS.	Time run.		Revolutions.	Gallons Pumped.
	H.	M.		
July	213	00	198,035	155,457,475
August	709	50	572,815	449,659,775
September	482	50	454,390	356,696,150
October	710	40	623,225	489,231,625
November	720	00	630,430	494,887,550
December	744	00	678,140	532,339,900
January	572	00	598,830	470,081,550
February	649	30	593,525	465,917,125
March	478	30	416,725	327,129,125
April	369	45	334,670	262,715,950
May	734	30	647,840	508,554,400
June	709	10	638,340	501,096,900
Total	7,089	05	6,386,965	5,013,767,525

ENGINE No. 5.

July	744	00	655,980	641,548,440
August	744	00	663,950	649,343,100
September	600	00	519,830	508,393,740
October	705	35	580,950	568,169,100
November	720	00	598,505	585,337,890
December	744	00	654,230	639,836,940
January	714	05	604,100	590,809,800
February	672	00	623,570	609,851,460
March	514	55	618,070	604,472,460
April	597	45	499,045	488,066,010
May	744	00	631,030	617,147,340
June	720	00	627,190	613,391,820
Total	8,220	20	7,276,450	7,116,368,100

ENGINE No. 6.

July	744	00	627,825	614,012,850
August	744	00	640,160	626,076,480
September	720	00	622,895	609,191,310
October	720	00	571,020	558,457,560
November	720	00	585,065	572,193,570
December	744	00	623,595	609,875,910
January	724	30	524,825	513,278,850
February	672	00	584,665	571,802,370
March	697	45	582,300	569,489,400
April	552	55	460,865	454,637,970
May	744	00	616,850	603,279,300
June	720	00	620,175	606,531,150
Total	8,503	10	7,060,240	6,908,826,720

TOTAL EXPENSE PUMPING WATER, 1906-1907.

Fuel coal consumed	$37,461 48
Salaries	37,638 10
Repairs boiler and engine	1,222 08
Engine oil and grease	947 96
Waste and rags	188 00
Boiler and engine supplies	757 26
Packing and hose	249 09
General supplies	291 86
Electric light fixtures and supplies	45 93
Ice	109 30
Paint, lead and glass	142 71
Printing and stationery	15 55
Horse expense	65 00
Kerosene and gasoline	15 15
Boiler inspection and insurance	30 00
Telephone	55 00
Feed and bedding, horse	109 68
Towel supply	68 65
Total	$79,412 80

The cost of fuel per million gallons pumped was $1.48 and per million gallons pumped 100 feet high was $1.17. The table shows that the amount of water pumped during the year was 25,118,295,041 gallons, making the daily average 68,817,247, which is an increase of 10 per cent. compared with the preceding year.

The total expense during the year for pumping water, including maintainance, heating station, library and greenhouse, hoisting coal, etc., was $79,412.80, thus making the cost per million pumped, $3.16.

The station duty of coal consumed for all purposes for the year was 84,698,474 foot pounds.

The engines are in a fair working order and giving satisfactory service.

No. 2 engine which had foundation under main pillow block rebuilt, was completed and put into service March 8, and doing fully as well as could be expected. The boilers are in good condition; the three vertical water tube boilers installed last year have been tested and accepted by the Board and are now giving good service.

The buildings are in a fair condition. The coal sheds are now taxed to their utmost capacity. I would recommend building an additional shed.

Respectfully yours,

URIAH GOULD,

Chief Engineer.

Distribution System.

TOTAL AMOUNT OF PIPE LAID AND DISCONTINUED IN THE LOCATIONS NAMED DURING THE YEAR ENDING JUNE 30, 1907

Size in Inches	Detroit		St. Clair Hig'ts		Fair-view	Ecorse	Ham-trm'k	High-l'nd P'k	Total Feet Laid	Total Feet Discon-tinued	Net In-crease
	Feet Laid	Feet Discon-tinued	Feet Laid	Feet Discon-tinued	Feet Laid	Feet Laid	Feet Laid	Feet Laid			
4	300	4,808	......	......	436	......	......	......	736	4,808	......
6	69,239	8,268	5,178	2.249	26,478	425	2,401	6,632	110353	10,517	......
8	12,138	557	7,491	278	2,027	......	......	......	21,656	835	......
10	11,198	......	49	......	......	......	......	......	11,247	......	......
12	9,594	.....	3,813	......	......	......	......	......	13,407	......	.....
30	69	.....	......	......	......	......	......	......	69	......	......
36	279	.....	......	......	......	.....	....	......	279	......	......
	102817	13.633	16,531	2,527	28.941	425	2,401	6,632	157747	16,160	141587
						Amount in miles			$29\frac{4627}{5280}$		$26\frac{4307}{5280}$ Miles

NUMBER OF FEET OF PIPE OF THE SIZES INDICATED INSIDE AND OUTSIDE OF DETROIT JUNE 30, 1907.

Size Inches.	June 30th, 1906.	Laid From June 30, '06 to June 30, 1907.	Disc'ntinu'd During year Ending June 30, '07	Total on June 30, '07	In Detroit	Outside Detroit
45	103	....	....	103	103	....
42	83,187	....	....	83,187	83,187	....
36	7,611	279	....	7,890	7,890	....
30	54,558	69	....	54,627	54,627	....
24	84,840	....	....	84,840	84,840	....
20	393	....	....	393	393	... .
18	87	....	....	87	87	....
16	55,939	....	....	55,939	55,124	815
12	58,599	13,407	....	72,006	63,978	8,028
10	204.372	11,247	....	215,619	208,944	6,675
8	403,571	21,656	835	424,392	368,491	55,901
6	1,714.390	110,353	10,517	1,814,226	1,618,676	195,550
4	870,803	736	4,808	866,731	830,580	36,151
3	62,079	....	....	62,079	62,079	....
2	14,593	....	....	4,593	4,593	....
	3,605,125	157,747	16,160	3,746.712	3 443,592	303,120
		Total in miles		$709\ \frac{3192}{5280}$	$652\ \frac{1032}{5280}$	$57\ \frac{2160}{5280}$

Number of Feet of Pipe laid outside of Detroit during the years named ending June 30th, 1907.

LOCATION	Size	1891	1892	1893	1894	1895	1896	1897	1898	1899	* 1901	1902	1903	1904	1905	1906	1907	Amount Discont'd	Total of each Size	Total each Village
Fairview	6																259		259	
"	8								4,216						4,689		2,027		6,716	6,975
St. Clair Heights	6			6,930		3,641											5,178	†2,249	14 306	
"	8																7,491	‡ 278	7,213	
"	10																49		49	
"	12																3,813		3,813	25,381
Leesville	8						3,009												3,009	3,009
Hamtramck	4		3,541										7,442	6,034	1,330		2,401		20,748	
"	6	3,135			8,376			141		534			25,853	33,303	3,280	1,100			75,722	
"	8												4,964	6,712					11,676	
"	10												2,394						2,394	110,540
Highland Park	4							7											7	
"	6						18,137	508		3,395				6,005	3,742	10,486	6,632		48,905	
"	8							41		235				778					1,054	
"	10						3,457	700		75									4,232	
"	12						4,200	15											4,215	
"	16						815												815	59,228
State Fair Line	8														9,392				9,392	9,392
LaSalle Gardens	4							2,330											2,330	
"	6							10.617			255								10,872	
"	8							261											261	13,463
River Rouge	4										7,031	651		3,340					11,022	
"	6										19,595	25	1,395	2,375	11,782			§1,782	33,390	
"	8										7,410								7,410	51,822
Ecorse	4													2,044					2,044	
"	6													11,671			425		12,096	
"	8													9,170					9,170	23,310
Total each year		3,135	3.541	6,930	8,376	3,641	29,618	14,620	4,216	4,239	34,291	676	42,048	81,972	35,021	11,586	28,275	6,613	Gd. Total	308,120 57$\frac{2}{5}\frac{160}{5280}$ Mls

* 18 Months   † 1907   ‡ 1904

NOTE. Formally shown in Fairview Pipeage
Now in Detroit through annexation

	4,841 Ft. of 4"
	54,262 Ft. of 6"
	15,062 Ft of 8"
Total,	74,165 Ft.

GATE SYSTEM JUNE 30TH, 1907.

SIZE.	42-IN.	36-IN.	30-IN.	24-IN.	20-IN.	18-IN.	16-IN.	12-IN.	10-IN.	8-IN.	6-IN.	4-IN.	3-IN.	TOTAL.
Murdock	5	...	11	16	...	...	27	48	186	450	1,605	1,259	11	3,618
Flowers	20	...	9	18	...	...	...	...	39	51	245	434	20	836
Galvin	...	1	7	12	...	...	21	...	13	31	171	242	1	499
Michigan Brass and Iron Works	10	...	9	2	11	...	13	14	70	154	768	106	...	1,157
Pittsburgh	...	...	...	15	...	2	1	1	10	12	31	115	...	187
Roe Stephens (Scott)	...	...	...	...	...	...	...	5	1	6	42	....	...	54
Eddy	...	...	...	...	...	...	...	...	15	3	6	8	...	32
Scowden	...	...	...	...	...	...	...	...	7	18	48	12	...	85
Ludlow	...	...	...	...	...	...	...	...	1	2	9	5	...	17
St. Louis	...	...	...	...	...	...	...	3	....	....	....	....	...	3
Detroit Water Works	15	4	3	4	...	...	5	40	110	217	995	308	...	1,701
Prong	...	...	...	...	..	...	...	...	....	....	1	....	...	1
Boston	...	...	...	...	...	...	...	...	....	1	1	....	...	2
Newport	...	...	...	...	...	...	...	...	....	....	....	1	...	1
Name Unknown	...	..	...	...	...	...	...	...	....	3	9	32	1	45
TOTAL	50	5	39	67	11	2	67	111	452	948	3,931	2,522	33	8,238

GATES SET FOR SHUT-OFF FROM JULY 1, 1906, TO JUNE 30, 1907.

SIZE	42-in.	36-in.	12-in.	10-in.	8-in.	6-in.	4 in.	Total
Detroit Water Works—City	2	1	12	14	32	163	23	247
Smith, Sleeves and Valves			1	2	1	1		5
Detroit Water W'ks—St. Clair H'ghts			1					1
Murdock—St. Clair Heights			1			1		2
Mich. Brass & Iron W'ks. St. Cl'r H'ts			1					1
Galvin—St. Clair Heights						1		1
Detroit Water Works—Fairview					3	20		23
Detroit Water Works-Highland Park						7		7
Detroit Water Works—Ecorse						1		1
Detroit Water Works—Ham ramck						3		3
Total	2	1	16	16	41	200	23	299

SHUT-OFF GATES DISCONTINUED.

NAME	SIZE					
	4	6	8	10	12	Total
Detroit Water Works	2	13	2	2		19
Murdock	22	12	2	1		37
Galvin	5					5
Mich. Brass and Iron Works		9				9
Pittsburg	4					4
Scott					1	1
Total	33	34	4	3	1	75

BLOW OFF GATES SET FROM JULY 1st, 1906 TO JUNE 30th, 1907.

4 INCH	6 INCH	TOTAL
83	2	85

TOTAL AND AVERAGE COST OF WELLS BUILT OVER GATES

OVER OLD LINES.		Average.
24 gate wells, 4" and 6"	$ 621.96	$25 92
5 gate wells, 8"	113 30	22 66
1 gate well, 16",	36 71	
30	$ 772 01	

WELLS OVER NEW LINES.
(Cost included in pipe lines.)

277 gate wells, 4", 6" and 8"................
32 gate wells, 10" and 12" ....
3 gate wells, 36" and 42" ....
312

The following is a statement of examinations, operations and repairs of gates, etc.

7,160 gates examined.
391 shut-offs for pipe lines and repairs.
161 tees set for fire department.
4,252 wells in system.

MISCELLANEOUS WORK.

KIND OF WORK	No.	COST OF LABOR	COST OF MATERIAL	HORSES AND WAGONS	TOTAL COST
Leaks in Mains......	90	$ 2,062 83	$ 570 45	$ 218 79	$ 2,852 07
Leaks in service connections..........	532	1,288 58	11 91	263 24	1,563 73
Service cocks inserted	954–1″ 3886–⅝″	2,471 90	2 ,707 21	659 52	5,838 63
Smith Sleeves and Valves set........	105	625 09	1,664 70	91 15	2,380 94
Services disconnected	173	177 92	15 26	42 25	235 43
Taking out 6″ meter.	....	4 08	6 66	1 00	11 74
Gates examined, repaired and operated	....	1,884 29	108 54	179 38	2,172 21
Hydrants examined repaired and put in	......	138 09	57 24	22 88	218 21
Ditches, Streets, etc. repaired..........	......	98 69	13 94	22 14	134 77
Gate and meter wells repaired, set to grade etc...............	....	460 29	174 68	71 76	706 73
Gate boxes repaired, set to grade etc ...	....	84 88	12 17	21 91	118 96
Private gate wells built.............	....	140 77	344 47	52 77	538 01
Examining Pipe	....	2 06	....	55	2 61
Plumbing at Pumping Station	....	47 18	2 67	....	49 85
Plumbing on service connections etc....	....	3 83	40	25	4 48
Locating and changing connections...	......	51 92	47	9 47	61 86
Private connections put in....	....	187 63	71 78	11 25	270 66
Locating and cutting out old main......	....	8 45	....	1 88	10 33
Testing pipe for plumber et al.....	....	381 30	....	28 13	409 43
Putting in horse stalls at pumping station	....	4 22	20 23	1 13	25 68
Moving pipe back of curb.......... ..	....	6 05	....	....	6 05
Moving tanks at crib	....	12 84	....	1 00	13 84
Getting depth of pipe	....	49 41	....	10 36	59 77
Fire plants examined etc..............	....	280 24	21 70	72 41	374 35
Water hammer......	....	6 09	....	77	6 86
Putting iron band on 3″ connection.....	....	63	2 23	13	2 99
Putting hose bibbs for air in 42″ mains..	....	11 66	7 55	3 31	22 52

MISCELLANEOUS WORK—Continued

KIND OF WORK	No.	COST OF LABOR	COST OF MATERIAL	HORSES AND WAGONS	TOTAL COST
Air valves repaired etc.		$ 6 70	$	$ 2 13	$ 8 83
Air chambers examined, emptied, etc.		7 88		2 13	10 01
Relief valves examined etc		17 38		4 38	21 76
Pressure gages put in, examined, etc.		88 19	47	22 40	111 06
Getting Pressures		3 08		88	3 96
Flushing sewers at pumping station		2 98		38	3 36
Blow-offs repaired		59 62	40 26	11 80	111 68
Blow-offs on dead ends opened	7891	2,432 86		69 82	2,502 68
Flushing mains and service for bad water		345 87		57 85	403 72
No water	37	49 44		12 29	61 73
Short supply	57	84 49	02	16 92	101 43
Letting on service connection, etc.	36	26 57		6 98	33 55
Shutting off service connections, etc.	111	132 39		35 13	167 52
Miscellaneous cartage		180 21		120 76	300 97
Miscellaneous work.		6 99		1 76	8 75
Getting depths of frost		3 26		76	4 02
Total		$13.938 83	$ 5 855 11	$ 2,153 80	$21,947 74

PIPE LOWERED FROM JULY 1st, 1906 TO JUNE 30th, 1907.

	FEET	INCHES		
Holbrook Ave.........	666	6	$ 238 71	
Junction Ave. Subway	1763	8		
Junction " "	310	6		
Junction " "	50	2		
Junction " "	18	3		
Lead pipe	450	1		
Lead pipe	245	5/8		
Lead pipe	50	3/4	3562 97	
Military Ave..........	315	6	132 19	
14th Ave. Subway.....	72	2		
" " "	40	3		
" " "	740	6		
Lead pipe	305	5/8		
Lead pipe	55	1½		
Lead pipe	106	1½	1680 25	
				$5614 12

RECAPITULATION.

	FEET	INCHES
Iron Pipe..	122	2
Iron Pipe..	58	3
Iron Pipe..	2031	6
Iron Pipe..	1763	8
Lead Pipe..	50	3/4
Lead Pipe..	550	5/8
Lead Pipe..	161	
Lead Pipe..	450	1
	5185	Feet.

PIPE LAID INSIDE THE CITY FROM JULY 1st, 1906, TO JULY 1st, 1907

Date	LOCATION OF PIPE.	Feet.	Size.	COST OF CONSTRUCTION.											
				Pipe.	Specials.	Lead.	Gates.		Sundries.	Gate-well.	Hauling.	Re-paving.	Sup. & Eng.	Labor.	Total Cost.
							No.	Cost.							
Oct. 9, 1906	Adele from 6 ft. w of w line of Chene to e line of St. Aubin	1,273	6 in.	$599 51	$13 55	$54 50		$41 85	$7 14	$59 38	$6 85		$63 65	$398 88	$1,245 31
Oct. 13, 1906	Annetta form 195 ft. n of n line of Caniff to 762 ft. n of n line of same	567	6 in.	268 50		21 32			2 21		13 59		28 35	135 21	469 18
Nov. 8, 1906	Annetta from 761 ft. n of n line of Caniff to 1305 ft. n of same	544	6 in.	287 23	83	23 69			1 04		8 08		27 20	131 75	479 82
Dec. 29, 1906	Alexandrine from 3 ft. w of e line of Brush to 16 ft. w of e line of Beaubien	424	8 in.	308 38	28 24	43 74		53 85	9 99	63 89	16 73		21 20	341 75	887 77
Apr. 12, 1907	Alger from 4 ft. w of w line of Oakland to 500 ft. w of w line of same	496	6 in.	279 74	2 85	29 06		10 00	5 91		9 28		24 80	154 50	516 24
June 28, 1907	Alger from 464 ft. e of e line of Greeley to 514 ft. e of e line of same	50	6 in.	28 26		2 95			10		2 75		2 50	19 47	56 03
July 18, 1906	Boulevard n (s s) from 332 ft. w of w line of 2nd to 381 ft. w of same	49	6 in.	23 20		2 75			02		4 63		2 45	13 84	46 89
Aug. 27, 1906	Boulevard n from 390 ft. w of w line of Chene to 428 ft. w of w of same	38	6 in.	17 99		1 76			13		1 03		1 90	14 92	37 73
Aug. 9, 1906	Boulevard w (w s) from 1 ft. s of s line of Buchanan to 7 ft. s of n line of Nall	648	6 in.	304 97	7 94	28 43		10 95	5 07		12 40		32 40	167 49	569 65
Sept. 18, 1906	Boulevard w (w s) from 1 ft. n of s line of Scovell to 136 ft. s of s line of same	137	6 in.	64 88	1 58	8 78		24 90	5 32	20 57	4 78		6 85	51 59	189 25
Oct. 22, 1906	Beaufait from 24 ft. s of n line of Medbury to 4 ft. s of n of Boulevard	341	8 in.												
	Also Medbury from 1 ft. w of w line of Beaufait to 22 ft. e of e line of same	22	6 in.	261 12	9 92	28 43		13 95	1 89	21 32	10 32		18 15	141 50	506 60
Nov. 15, 1906	Belvidere from 632 ft. n of n line of Moffatt to 180 ft. s of s line of same	872	6 in.	459 36	3 33	37 91		13 95	2 43	21 33	8 73		73 60	238 96	829 60

Nov. 6,1906	Boulevard w (w s) from 206 ft. s of s line of n Boulevard to n line of Scovell	572	6 in.	299 90	8 91	28 48	....	13 95	2 06	21 58	12 42	.....	28 60	241 67	657 52
Dec. 13,1906	Boulevard w (w s) from s line of Hancock s to 96 ft. s of s line of same	98	6 in.	51 22	5 59	7 38	....	24 90	54	21 20	3 85	.....	4 90	31 27	150 85
Jan. 10,1907	Beaufait from 16 ft. n of s line of Mack to 31 ft. s of n line of Kercheval	3,548	10 in.	3,557 23	86 29	136 08	....	55 90	34 41	41 43	69 21	4 55	177 40	2,171 09	6,333 59
Dec. 29,1906	Berlin from 32 ft. w of e line of Beaufait to 28 ft. e of w line of Bellevue	390	8 in.	285 56	17 37	24 30	....	33 90	3 55	42 20	7 80	.....	19 50	154 54	588 72
Feb. 9,1907	Brooklyn from 56 ft. n of s line of Holden to 594 ft. s of s line of same	650	8 in.	469 57	32 45	81 38	. ..	64 80	11 41	62 65	....	18 97	32 50	....	773 73
	Also in "Courtway"	246	8 in.	168 54	39 28	....	....	33 90	24	45 08	25 13	4 83	12 30	777 42	1,106 72
Apr. 13,1907	Brown from 30 ft. w of e line of Vinewood to 346 ft. e of e line of same	376	6 in.	210 79	7 25	20 24	....	25 22	5 52	21 54	8 99	.....	18 80	141 54	459 99
Apr. 11,1907	Boulevard w (e s) from 83 ft. n of s line of n Boulevard to 160 ft. s of s line of same..............	243	6 in.	183 37	33 05	28 19	....	15 12	5 19	21 54	10 65	.....	12 15	214 15	473 41
May 8,1907	Boulevard n (n s) from 7½ ft. w of e line of St. Aubin to 166½ ft. e of e line of same............	174	6 in.	97 20	12 35	15 63	.	25 22	12 91	20 67	7 58	.....	8 70	72 09	272 85
May 10,1907	Boulevard n (n s) from 6 ft. e of e line of Dubois to 429 ft. e of e line of same	423	6 in.	237 92	4 78	21 88	....	10 10	8 96	....	4 23	.....	21 15	126 95	435 97
May 15,1907	Bellevue from 51 ft. n of n line of Jefferson to 566 ft. n of n line of same	635	12 in	858 99	67 25	128 13	....	237 90	52 04	55 90	60 99	5 67 8 85	31 75	916 88	2,444 85
May 9,1907	Boulevard w (w s) from n line of Moore Pl. to 37 ft. n of s line of Scovell	696	8 in.	541 97	31 33	51 25	....	24 15	3 75	20 53	15 47	.....	34 80	357 53	1,080 78
May 29,1907	Boulevard Grand (e s) w from 322 ft. n of n line of Nall to 72 ft. s of s line of same	454	6 in	254 31	4 05	15 38	....	15 12	1 86	21 81	10 08	.....	22 70	164 36	509 62
May 29,1907	Boulevard e (w s) from 260 ft. s of s line of Sylvester to 462 ft. s of s line of same	202	6 in	114 16	....	9 38	....	....	72	....	4 25	.....	10 10	68 17	206 78
June 4,1907	Boulevard e (e s) w from 512 ft. n of n line of Kercheval to 573 ft. n of n line of same	61	6 in.	34 47	....	2 56	....	....	15	....	2 63	. ..	3 05	24 84	67 70
June 4,1907	Boulevard (e s) w from 19 ft. s of s line of Mack to 100 ft. s of s line of same	1,265	6 in	711 49	14 70	48 69	.. .	41 34	7 47	64 47	13 03	. .	63 25	451 13	1,415 57
June 14,1907	Brooklyn crossing Grand River....	105	8 in	77 99	14 00	12 81	...	24 15	14 77	10 28	13 25	25 88	5 25	282 34	481 22

PIPE LAID FROM JULY 1st, 1906 TO JULY 1st, 1907.—CONTINUED.

Date.	LOCATION OF PIPE.	Feet.	Size.	COST OF CONSTRUCTION.											
				Pipe.	Specials.	Lead.	Gates.		Sundries.	Gatewell.	Hauling.	Repaving.	Sup. & Eng.	Labor.	Total Cost.
							No.	Cost.							
July 25,1906	Cicotte from 40 ft. n of s line of Field to 6 ft. s of s line of Dennis .... Also Michigan from 34 ft. w of e line of Cicotte....................	35 28 25	6 in 6 in.	1,676 37	46 46	157 08	....	94 65	13 44	149 15	32 89	23 94	177 65	1,047 43	3,419 06
July 6,1906	Cavalry from 20 ft. s of n line of Anthon to 27 ft. s of s line of Hussar	192	6 in.	89 92	6 19	9 24	....	13 95	54	20 62	3 13	.....	9 60	63 50	216 69
July 27,1906	Commonwealth from 792 ft. s of s line of Piquette to n line of R. R.	243	6 in.	115 07	4 77	11 70	....	13 95	4 05	20 57	6 52	.....	12 15	81 50	270 28
Sept. 24,1906	Cicotte from 5 ft. s of s line of Dennis to 120 ft. s of s line of Otis	699	6 in.	330 54	5 74	33 17	....	10 95	5 46	....	6 31	.....	34 95	168 88	596 00
Sept. 28,1906	Canton from 4 ft. s of s line of Mack to 228 ft. s of s line of same	284	6 in.	134 49	8 03	14 22	...	10 95	4 81	....	3 75	.....	14 20	58 00	248 45
Sept. 29,1906	Canton 469 ft. n of n line of Kercheval to 700 ft. n of n line of same	231	6 in.	109 39	2 72	9 48	....	....	48	....	7 84	.....	11 55	51 75	193 21
Oct. 19,1906	Chippewa from 8 ft. s of n line of Gratiot to 501 ft. n of n line of same	509	6 in.	240 09	5 74	21 32	....	24 90	6 63	21 33	10 13	.....	25 45	167 36	522 95
Oct. 26,1906	Crossly from 25 ft. s of n line of Fort to 443 ft. s of s line of same	518	6 in.	272 93	9 20	29 25	....	24 90	8 84	21 46	15 69	.....	25 90	169 33	577 50
Nov. 7, 1906	Calvert from 2 ft. w of w line of Woodward to 12 ft. w of e line of Second	833	6 in.	439 83	9 07	37 91	....	10 95	3 70	20 60	10 13	.....	41 65	207 50	781 33
Nov. 19,1906	Cahalan from 21 ft. w of e line of Lawndale to 47 ft. e of e line of Mullane	953	6 in.	502 13	5 67	48 00	....	27 90	3 40	38 42	13 70	.....	47 65	220 08	906 95
Dec. 4, 1906	Concord from 6 ft. s of n line of n Boulevard to 13 ft. s of n line of Harper .... Also Lambert from 27 ft. e of w line of Concord to 14 ft. e of e line of same	1,862 53	12 in. 6 in.	2,392 14	92 11	189 54	....	98 90	15 15	108 39	59 53	.....	95 75	1,131 90	4,183 41

Dec. 24,1906	Cavalry from 36 ft. s of n line of Fort to 21 ft. s of n line of Anthon	433	6 in.	228 10	5 56	24 30	..	27 90	5 06	42 90	7 59	7 24	21 65	152 05	522 35
Apr. 2, 1907	Calvert from 12 ft. w of e line of 2nd to 52 ft. w of w line of same	122	6 in.	67 82		8 72	....	15 12	2 08	22 09	4 31	.....	6 10	39 24	165 48
Apr. 6, 1907	Canton from 39 ft n of s line of Gratiot to 35 ft. s of n line of Hancock	400	6 in.	225 48	8 98	23 25	..	15 12	5 64	21 54	10 87	14 76	20 00	152 75	498 39
Apr. 10,1907	Cameron from 34 ft. s of n line of Holbrook to 582 ft. n of w line of same	616	6 in.	346 99	11 98	34 88	....	25 22	9 01	20 98	8 56	.....	30 80	200 01	688 43
Apr. 11,1907	Cavalry from 1[illegible]4 ft. [illegible] of s line of Hardy to 356 ft. n of n line of same	590	10 in.												
	Also Harvey from 19 ft. w of e line of Cavalry to 13 ft. e of e line of same	37	6 in.	644 96	15 25	48 69	....	27 95	5 64	23 31	17 47	.....	31 55	180 99	995 61
Apr. 25,1907	Canfield Pl. 21 ft. w of e line of Baldwin	620	8 in.												
	Also Townsend from 2 ft. s of s line of Canfield to 25 ft. n of n line of same	27	6 in.	500 51	26 18	56 38	....	54 39	4 21	64 25	5 73	....	32 85	199 00	943 00
May 14,1907	Canton from 91 ft. s of s line of Waterloo to 82 ft. n of n line of same	233	6 in.	130 54	1 18	5 13	..	15 12	36	20 53	2 73	....	11 65	61 50	248 74
May 21,1907	Commonwealth from 27 ft. n of s line of Grand River to 23 ft. n of s line of Alexandrine	855	8 in.	662 50	35 60	61 50	...	48 30	7 68	45 27	11 83	.....	42 75	474 18	1,389 56
May 25,1907	Cardoni from 32 ft. s of n line of Holbrook to 600 ft. n of n line of same	632	6 in.	354 90	18 38	34 38	....	25 22	12 20	21 29	9 76	5 26	31 60	227 50	740 49
May 8, 1907	Calvert from 50 ft. w of w line of Second to 286 ft. w of w line of Third	1,137	6 in.	641 42	5 15	41 00	....	15 12	1 39	20 91	12 25	.....	56 85	340 56	1,134 65
June 6, 1907	Canton from 3 ft. n of s line of Boulevard to 74 ft. n of n line of Ferry	687	6 in.	387 68	2 38	23 06	....	15 12	4 28	21 16	20 75	.....	34 35	192 76	701 54
June 28,1907	Cavalry from 19 ft. n of n line of Driggs to 24 ft. s of s line of Hussar	760	10 in.	813 47	18 73	50 36	....	27 95	7 46	21 81	11 51	.....	38 00	376 87	1,366 66
June 27,1907	Cavalry from n line of Jefferson to 103 ft. n of n line of Reeder, and from 21 ft. w of e line of Cavalry to e line of same; also temporary connections between old 6 in. and new 10 in. line	495	10 in.												
		21	6 in.	535 08	31 73	29 03	...	10 10	26 45	19 21	4 50	.....	26 25	273 69	956 04

PIPE LAID FROM JULY 1st, 1906, TO JULY 1st, 1907—CONTINUED.

Date.	LOCATION OF PIPE.	Feet.	Size.	COST OF CONSTRUCTION.											
				Pipe.	Specials.	Lead.	Gates.		Sundries.	Gatewell.	Hauling.	Repaving.	Sup. & Eng.	Labor.	Total Cost.
							No.	Cost.							
July 27, 1906	Delray Ave. from 22 ft. s of n line of River to 426 ft. n of n line of same	448	6 in.	$209 30	$ 8 12	$ 27 72	...	$33 95	$ 6 45	$18 66	$ 16 22	.....	$22 40	$92 59	$ 435 41
Oct. 23, 1906	Dubois from 105 ft. s of s line of Medbury to 328 ft. n of n line of same	488	8 in.	355 49	14 13	30 80	....	....	4 22	....	10 25	.....	24 40	322 38	761 67
Oct. 17, 1906	Delray Ave from 426 ft. n of n line of River to 560 ft. n of n line of same	134	6 in.	63 45	....	5 85	....	....	39	....	6 57	.....	6 70	44 25	127 21
Dec. 15, 1906	Durand from 410 ft. e of e line of Van Dyke to 560 ft. e of e line of same	150	6 in.	78 67	1 06	9 72	....	....	47	....	6 01	.....	7 50	59 65	163 08
May 23, 1907	Driggs from 43 ft. e of w line of Campbell to 20 ft. w of e line of Cavalry	567	8 in.	441 14	19 45	33 31	....	24 15	2 15	23 52	14 84	.....	28 35	204 01	790 92
Sept. 24, 1906	Eastern Pl. from 30 ft. w of e line of Vinewood to 25 ft. e of w line of Roosevelt	614	6 in.	290 29	10 06	28 43	....	18 95	3 81	19 68	4 46	.....	30 70	161 68	563 06
Nov. 3, 1906	Edison from w line of Woodward to 479 ft. w of w line of same	479	6 in.	252 91	10 17	18 95	....	10 95	3 37	21 16	7 92	.....	23 95	141 00	490 38
Nov. 18, 1906	Eastern Pl. from 178 ft. e of e line of Roosevelt to 7 ft. w of w line of Chope Also 23rd from Chope to Ivy Pl.	302 312	6 in. 6 in.	322 08	5 18	29 16	....	13 95	4 13	20 85	6 24	.....	30 70	176 94	639 23
July 23, 1906	Felch from 48 ft. w of e line of McCellan to 269 ft. e of e line of same	317	6 in.	149 64	9 41	18 48	....	24 90	7 86	21 01	6 77	....	15 85	115 00	368 93
Aug. 21, 1906	Frontenac from 25 ft. n of n line of Hyde to 52 ft. n of n line of same	87	6 in.	41 20	1 58	4 39	....	....	1 45	....	8 04	.....	4 85	27 17	83 18
Oct. 9, 1906	Fisher from 27 ft. n of s line of Kercheval to 8 ft. n of s line of Waterloo	845	6 in.	400 15	8 12	37 91	..	24 90	8 60	20 62	10 01	1 72	42 25	265 50	819 78
Oct. 4, 1906	Fordyce from 265 ft. n of n line of Vulcan to 298 ft. n of n line of same.	33	6 in.	15 63	......	1 46	....	....	04	....	2 75	.....	1 65	8 59	30 12

Oct. 16, 1906	Fletcher from 25 ft. e of w line of Wesson to 11 ft. e of w line of Hammond	405	6 in.												
	And Hammond from 21 ft. s of n line of Fletcher to 31 ft. n of s line of Lola	334	8 in.												
	And Lola from 11 ft. e of w line of Hammond to 119 ft. e of w line of same	108	6 in.	462 93	23 65	51 19	....	41 85	7 11	64 62	18 71	.....	40 95	365 71	1,076 72
July 3, 1907	Field from 298 ft. n of n line of Medbury to 346 ft. n of n line of same	48	6 in.	26 13	....	2 46	...	....	13	....	1 88	.....	2 40	13 92	46 92
May 15, 1907	Finley from 26 ft. w of e line of Dubois to 883 ft. e of e line of same	909	6 in.	512 57	9 73	43 75	...	15 12	2 90	21 46	12 43	.....	45 45	226 85	890 26
June 1, 1907	Forest from 27 ft. w of e line of Grandy to 31 ft. e of w line of McDougall	864	8 in.	617 95	44 55	66 63	..	117 81	16 45	131 61	37 24	....	43 20	574 02	1,649 46
July 14, 1906	Gilbert from 25 ft. n of s line of Dennis to 54 ft. n of n line of Barkume	495	6 in.	233 46	14 33	23 10	....	13 95	5 69	21 16	11 51	.....	24 75	113 75	461 70
Sept. 25, 1906	Gilbert from 56 ft. n of n line of Otis to 615 ft. s of s line of same	177	6 in.	83 34	....	9 48	....	13 95	98	20 77	2 65	.....	8 85	45 17	185 19
Sept. 20, 1906	Gilbert from 33 ft. s of n line of Dennis to 20 ft. s of n line of Morton	2,240	6 in.												
	Also Michigan from 13 ft. e of e line of Gilbert to 33 ft. w of e line of same	46	6 in.	1,079 69	19 28	99 51	....	55 80	9 98	85 40	25 32	.....	114 30	640 85	2,130 13
Oct. 10, 1906	Greeley from 20 ft. s of n line of Wellington to 121 ft. n of n line of same	141	6 in.	66 30	2 41	7 11	....	24 90	5 43	20 18	5 61	.....	7 05	37 79	176 78
Oct. 15, 1906	Garfield from 4 ft. w of w line of Collins to 230 ft. w of w line of same	226	6 in.	106 55	1 06	7 08	....	....	96	....	4 20	.....	11 30	49 59	180 74
Apr. 8, 1907	Goldsmith from 278 ft. w of w line of Waterman to 341 ft. w of w line of same....................	63	6 in.	33 91	4 25	5 81	....	....	53	....	4 10	.....	3 15	31 19	82 94
May 7, 1907	Goethe from 418 ft. e of e line of McCellan to 470 ft. e of e line of same	52	6 in	28 26	4 20	4 38	....	....	05	... .	47	....	2 60	15 00	54 96
May 17, 1907	Greeley from 18 ft. s of n line of Alger to 121 ft. n of n line of Wellington	392	6 in.	221 53	....	18 75	....	15 12	2 08	21 54	4 13	.....	19 60	99 89	402 64

PIPE LAID FROM JULY 1, 1906, TO JULY 1, 1907—CONTINUED.

Date	LOCATION OF PIPE	Feet	Size	COST OF CONSTRUCTION											
				Pipe	Specials	Lead	Gates		Sundries	Gate-well.	Hauling	Re-paving	Sup. & Eng.	Labor	Total Cost
							No.	Cost							
May 21,1907	Greeley from 33 ft. n of s line of Holbrook to 11 ft. s of n line of Gillett	357	6 in.												
	Also Annar from 30 ft. w of e line of Greeley to 155 ft. e of e line of same and from 2 ft. n of s line to 5 ft. s of s line of Annar	192	6 in.	306 86	24 70	34 35		15 12	2 05	21 46	9 40	.....	27 45	178 81	620 23
May 27,1907	Greusel from 20 ft. n of n line of Julia to 39 ft. s of n line of Ingersoll	368	6 in.												
	Also Ingersoll from 30 ft. e of w line of Greusel to w line of Junction	340	6 in.	397 28	10 73	30 75	....	30 24	4 62	45 02	7 69	.....	35 40	297 00	858 73
May 28,1907	Granite from 85 ft. w of w line of Springwells to 21 ft. w of e line of same	130	6 in.												
	Also Springwells from 21 ft. s of n line of Granite to 101 ft. n of n line of same	121	6 in.	189 59	10 25	15 38	....	15 12	1 58	21 71	16 70	.....	12 55	66 09	298 97
June 7, 1907	Goldsmith from 438 ft. w of w line of Waterman to 681 ft. w of w line of same	243	6 in.	135 63	4 58	10 25	...	....	49	....	10 25	.....	12 15	45 30	218 65
June 5, 1907	Gilbert from 389 ft. s of s line of Waterloo to s line of same......	359	6 in.	219 83	....	17 19	..	....	88	....	5 49	....	19 45	120 87	383 71
June 26,1907	Grand River from 28 ft. w of e line of Vinewood to 181 ft. e of e line of Chope	1,836	12 in.	2,504 86	66 80	154 82	....	85 20	87 06	87 87	100 98	229 50	91 80	1,605 56	5,013 95
July 6, 1906	Hussar from 30 ft. e of w line of Cavalry to 115 ft. w of w line of same	145	6 in.	68 66	....	9 24	...	13 95	51	20 62	4 88	.....	7 25	36 75	161 86
Aug. 17,1906	Helen from 448 ft. n of n line of Kercheval to 49 ft s of s line of Waterloo	291	6 in.	137 80	.. ..	11 70	....	....	1 03	....	4 84	.....	14 55	92 03	261 96
Nov. 14,1906	Holborn from 480 ft. e of e line of Mt. Elliott to 597 ft. e of same..	117	6 in.	61 78	....	4 74	....	......	17	....	3 26	.....	5 85	26 42	102 22
Nov. 7, 1906	Hastings from 21 ft. n of s line of Farnsworth to 7 ft. s of n line of Theodore	266	8 in.	192 10	19 78	23 69	....	19 95	19 08	21 49	5 06	26 79	13 30	258 52	599 76

Oct. 16, 1906	Hudson from 7 ft. w of w line of Fourth to alley w of same	321	6 in.												
	Also alley w of Fourth from 22 ft. n of s line of Hudson to 22 ft. s of n line of same	82	6 in.												
	Also Hudson from alley w of Fourth to end of pipe e of Greenwood	92	6 in	234 41	7 74	23 69	....	....	94	....	9 38	18 30	24 75	112 91	432 12
Dec. 4, 1906	Hudson from [illegible] ft. w of e line of Humboldt to 85 ft. e of e line of same	109	6 in.	57 02	....	9 72	....	13 95	5 58	repair 63	2 75	.....	5 45	91 69	186 79
Dec. 4, 1906	Hudson from 35 ft. e of w line of Humboldt to w line of same.....	35	6 in.	18 48	1 67	3 00	....	....	2 21	....	88	16 72	1 75	22 44	67 15
Dec. 4, 1906	Hudson from 25 ft. w of e line of Humboldt to 24 ft. w of e line of Missouri	304	6 in.	158 40	7 85	17 10	....	13 95	3 62	21 20	7 60	.....	15 20	127 96	372 88
Dec. 14, 1906	Harper from 26 ft. e of w line of Concord to 302 ft. w of w line of Foster	880	12 in.	1,113 60	43 47	102 06	....	43 45	8 95	22 51	28 92	.....	44 00	629 75	2,036 71
Dec. 19, 1906	Holcomb from 695 ft. s of s line of Medbury to 914 ft. s of s line of same	219	6 in.	114 58	83	9 72	....	....	92	....	5 73	....	10 95	55 65	198 38
Apr. 2, 1907	Hurlbut from 20 ft. n of n line of Sylvester to 230 ft. n of n line of same	210	6 in.	118 68	1 10	11 63	....	....	39	... .	11 27	.....	10 50	54 25	207 82
Apr. 9, 1907	Harrington from 394 ft. n of n line of Fort to 600 ft. n of n line of same	206	6 in.	114 16	6 20	14 53	....	....	4 23	....	7 83	.....	10 30	76 01	233 26
May 10, 1907	Howell from 15 ft. s of n line of Albert to 257 ft. n of n line of same	272	6 in.	153 71	....	12 81	....	15 12	97	22 04	3 23	.....	13 60	89 77	311 25
June 1, 1907	Helen from 52 ft. s of s line of Waterloo to 155 ft. n of n line of same	266	6 in.	150 32	......	14 06	....	15 12	92	21 54	3 11	.....	13 30	77 95	296 32
Nov. 28, 1906	Inglis from 122 ft. s of s line of Dix to 265 ft. s of s line of same	122	6 in.	64 32	1 06	7 50	....	....	54	....	7 12	.....	6 10	38 59	125 23
Oct. 2, 1906	Kercheval from 12 ft. e of w line of Van Dyke to 16 ft. e of w line of Shephard	379	8 in.	250 18	9 77	28 43	....	19 95	1 20	21 00	5 86	.....	18 95	109 63	464 97
Jan. 10, 1907	Kercheval from 24 ft. e of w line of Bellevue to 234 ft. w of w line of same	264	8 in.	191 36	18 34	19 44	....	....	4 69	....	5 28	2 77	13 20	130 54	385 62
July 27, 1906	Lambert from e line of Van Dyke to 268 ft. e of e line of same....	268	6 in.	126 91	....	13 16	....	24 90	7 56	20 13	7 42	.....	13 40	104 85	318 33
July 13, 1906	Le Grand from 23 ft. e of w line of Pennsylvania to 135 ft. w of w line of same	158	6 in.	74 82	10 15	10 24	....	13 95	2 75	20 68	3 26	.....	7 90	80 92	224 67

PIPE LAID FROM July 1st, 1906 TO JULY 1st, 1907.—CONTINUED.

Date.	LOCATION OF PIPE.	Feet.	Size.	COST OF CONSTRUCTION.											
				Pipe.	Specials.	Lead.	Gates.		Sundries.	Gate-well.	Hauling.	Re-paving.	Sup. & Eng.	Labor.	Total Cost.
							No.	Cost.							
Sept. 8, 1906	Linzee from 40 ft. e of w line of Livernois to 437 ft. w of w line of Cicotte	1,203	6 in.	$ 506 84	$ 23 74	$ 52 12	....	$ 38 85	$ 8 84	$ 43 20	$ 15 37	.....	$ 60 15	$ 343 47	$1,152 08
Sept. 17,1906	Lincoln from 24 ft. s of n line of Milwaukee to 44 ft. n of n line of same	90	6 in.	42 62	6 86	5 85	..	10 95	11 04	....	4 50	.....	4 50	45 14	131 46
Sept. 27,1906	Longfellow from 16 ft. w of e line of Third to 6 ft. w of e line Hamilton Boulevard	890	6 in.	420 51	10 46	48 87	....	13 95	4 33	21 00	14 97	.....	44 50	266 25	844 34
Sept. 26,1906	Lovett from 37 ft. s of n line of Warren to 312 ft. n of n line of same	358	6 in.	166 22	6 59	16 59	....	24 90	5 92	20 95	8 60	.....	17 65	99 40	366 82
Oct. 11,1906	Lessing from 347 ft. e of e line of McCellan to 468 ft. e of e line of same	121	6 in.	57 30	83	4 74	....	....	43	....	2 99	.....	6 05	48 33	120 67
Oct. 6, 1906	Leavitt from 746 ft. w of w line of Junction to 43 ft. e of w line of same	789	8 in.	517 52	24 30	61 60	....	19 95	4 76	23 84	32 51	.....	39 45	482 10	1,206 03
Oct. 28,1906	Lamson from 14 ft. n of s line of Pallister to 201 ft. s of s line of same	246	6 in.	129 36	6 93	14 28	....	24 90	5 77	22 14	5 88	....	12 30	69 91	291 42
Oct. 18,1906	Lane from 21 ft. e of w line of Springwells to 223 ft. w of w line of same	244	6 in.	115 54	2 41	13 16	....	24 90	7 05	20 13	7 05	.....	12 20	54 81	257 25
Nov. 23,1906	Lafayette from 200 ft. w of w line of Govin to 451 ft. w of w line of same	251	6 in.	132 53	2 34	12 00	..	....	1 00	....	7 02	.....	12 55	77 99	245 43
Dec. 12,1906	Lincoln from 43 ft. n of n line of Milwaukee to 12 ft. n of s line of Boulevard	427	6 in.	221 76	10 44	19 44	....	....	8 28	....	17 50	....	21 35	298 65	592 42
Dec. 17,1906	Lucky Pl. from 34 ft. s of n line of Harper to 213 ft. s of s line of same	259	6 in.	135 70	9 29	9 72	....	24 90	2 68	20 92	10 15	.....	12 95	105 25	331 56
Jan. 18, 1907	La Salle from s line of Warren to 66 ft. s of s line of Herbert....	470	6 in.	247 10	3 33	24 30	....	... .	1 94	21 80	5 67	.....	23 50	191 77	519 41
Apr. 6, 1907	Lawton from 5 ft. n of n line of Warren to 14 ft. s of n line of Putnam	470	6 in.	265 04	......	29 06	....	15 12	3 41	42 42	4 88	.....	23 50	188 56	571 99

May 18,1907	Lafayette Boulevard from 21 ft. 6 in. w of e line of Scotten to 95 ft. e of e line of same	117	6 in.	64 42	8 50	10 25	....	40 34	4 21	45 60	4 13	....	5 85	85 46	268 76
May 28,1907	Laurence from 388 ft. w of e line of Second to 707 ft. w of e line of same	319	6 in.	179 71	4 05	15 63	....	....	3 66	....	7 14	.....	15 95	96 48	322 62
May 23,1907	Lafayette from 29 ft. e of w line of 17th to 111 ft. w of w line of same	140	6 in.	77 99	6 40	7 69	....	15 12	9 27	22 51	12 69	.....	7 00	85 63	244 30
June 5, 1907	Linden Ct. from 23 ft. s of n line of Linden St. to 34 ft. w of e line of 12th	440	6 in.	243 00	19 35	25 63	....	30 24	8 89	43 62	6 82	.....	22 00	234 99	634 54
June 20,1907	Lexington from 23 ft. w of e line of Green to 291 ft. e of e line of same	314	6 in.	175 75	8 75	18 75	....	25 22	5 63	21 09	15 00	.....	15 70	80 50	366 39
June 25,1907	Lawndale from s line of Woodmere to 620 ft. n of s line of same....	620	6 in.	347 55	4 88	26 61	....	10 10	5 05	repairs 6 30	19 00	.....	31 00	162 25	612 74
July 3, 1906	McDougall from 122 ft. s of s line of Warren to 85 ft. n of n line of same	267	6 in.	123 58	5 56	13 86	....	13 95	1 24	20 74	4 76	.....	13 35	80 77	277 81
July 24,1906	Meldrum from 23 ft. s of n line of Waterloo to 252 ft. n of n line of same	275	6 in.	129 75	2 85	13 86	....	13 95	96	21 01	5 48	rep'rs	13 75	44 85	246 46
July 11,1906	Missouri from 182 ft. s of s line of McGraw to 82 ft. n of n line of Stanley	339	6 in.	159 59	3 33	14 22	....	....	68	....	6 51	rep'rs	16 95	68 06	269 34
July 23,1906	Maxwell from 329 ft. n of n line of Mack to 452 ft. n of n line of same	123	6 in.	53 25	....	7 31	....	10 95	29	....	3 95	.....	6 15	34 09	115 99
July 29,1906	Morton from 39 ft. e of w line of Livernois to 188 ft. w of w line of Gilbert	609	6 in.	286 97	14 89	29 47	....	24 90	7 33	20 96	7 97	.....	30 45	163 28	586 22
Sept. 14,1906	Milwaukee from 26 ft. e of w line of Holden to 719 ft. e of e line of same	757	6 in.	358 48	8 30	38 03	....	18 95	7 65	20 13	8 93	.....	37 85	273 20	766 52
Sept. 27,1906	Medbury from 19 ft. w of e line of Rivard to 96 ft. e of e line of same	115	10 in.	102 16	13 95	11 85	....	38 90	7 21	21 33	2 90	.....	5 75	42 41	246 46
Oct. 23, 1906	Medbury from 2 ft. w of w line of Dubois to 2 ft. e of e line of same	55	6 in.	26 40	5 45	7 11	..	27 90	1 38	repairs 24 45	2 25	.....	2 75	34 51	132 20
Nov. 9, 1906	Markey from 20 ft. s of n line of Pelouze to 5 ft. n of n line of Michigan	1085	6 in.												
	Also Rubber from 21 ft. w of e line of Markey to 195 ft. w of w line of same	228	6 in.												
	Also Moyes from 21 ft. w of e line of Markey to 196 ft. w of w line of same	225	6 in.	806 26	13 77	81 90	....	102 60	24 12	99 97	10 20	.....	76 75	454 22	1,669 79

PIPE LAID FROM JULY 1st, 1906 TO JULY 1st, 1907

Date.	LOCATION OF PIPE	Feet	Size.	COST OF CONSTRUCTION.											
				Pipe.	Specials.	Lead.	Gates		Sundries,	Gatewell.	Hauling.	Repaving.	Sup. & Eng.	Labor.	Total Cost.
							No.	Cost.							
Oct. 14, 1906	Medbury from 20 ft. e of w line of Moran to 199 ft. e of e line of Ellery St.	703	6 in.	$ 370 66	$ 6 08	$ 33 17	....	$ 13 95	$ 4 10	$ 20 77	$ 8 62	.....	$ 35 15	$ 195 42	$ 687 92
Nov. 14,1906	Moore Pl. from w line of Chope to 29 ft. w of e line of Vinewood.	1000	8 in.	721 28	27 84	87 48	...	59 85	12 80	62 94	23 00	.....	50 00	411 93	1,457 12
Dec. 4, 1906	Missouri from 12 ft. s of n line of Hudson to 12 ft. n of s line of Stanley	469	6 in.	247 10	....	9 72	....	13 95	1 92	21 20	11 73	.....	23 45	148 88	477 95
Dec. 28,1906	Mack Ave. Bye Pass, Mack from 28 ft. w of e line of Hurlbut to 247 ft. w of w line of same	279	36 in.	2,078 83											
	Also Mack from 247 ft. w of w line of Hurlbut to 40 ft. w of e line of Cadillac	69	30 in.	335 36											
	Also Mack from 22 ft. n of s line of same to 20 ft. s of n line of same	20	12 in.	23 04											
	Also Mack from 36 in. main to sewer	25	8 in.	18 90	For Drain										
	Also Mack from 42 in. main to sewer	45	8 in.	33 12											
	Also Hurlbut from 13 ft. w of w line of to 1 ft. e of e line of same	72	12 in.	72 96	651 73	398 52	....	2,402 84	180 88	Pears & Wells 1,519 70	211 76	....	22 65	2,492 75	10,443 04
Apr. 27,1907	McCellan from 1 ft. n of s line of Nichols to 123 ft. s of s line of Medbury	463	6 in.	260 52	9 68	25 63	...	15 12	1 60	23 73	14 46	....	23 15	89 16	463 05
May 7, 1907	McDougall Boulevard (w s) from 27 ft. e of w line of McDougall to 2 ft. e of w line of same; also 11 ft. n of s line of Medbury to 98 ft. s of s line of same	134	6 in.	73 47	7 20	9 69	....	25 22	7 14	20 67	2 75	.....	6 70	59 84	212 68
May 2, 1907	Medbury from 8 ft e of e line of Collins to 178 ft. e of e line of same	170	6 in.	96 07	1 75	9 69	....	10 10	6 89	21 98	4 64	.....	8 50	84 68	244 30
June 11,1907	Maxwell from 18 ft. n of s line of Gratiot to 274 ft. s of s line of Moffatt	911	6 in.	513 70	10 95	30 75		25 22	6 39	43 49	13 00	.....	45 55	250 00	939 05

July 28,1906	Mason from 23 ft. e of w line of Pennsylvania to 115 ft. w of w line of same	138	6 in.	64 88	4 52	9 08	....	13 95	1 54	21 56	4 09	.....	6 90	82 02	208 54
July 20,1906	Newland from 6 ft. s of n line of Mack to 408 ft. n of n line of same	414	6 in.	195 10	10 80	18 48	....	24 90	6 60	21 13	8 20	.....	20 70	109 25	415 16
May 21,1907	Newland from 407 ft. n of n line of Mack to 713 ft. n of same	306	6 in.	172 36	4 05	10 25	....	....	73	....	8 48	.....	15 30	85 75	296 92
May 19,1907	Nineteenth from 15 ft. n of s line of Fort to 22 ft. s of n line of Howard	928	10 in.					S. S. Valve and Gates							
	Also from 23 ft. s of n line of Fort to 15 ft. s of n line of same	18	12 in.												
	Also Lafayette from 30 ft. w of e line of 19th to 21 ft. e of w line of 18th St.	425	8 in.	1,336 04	77 60	175 34	....	231 00	118 76	93 91	111 63	23482	68 55	2,026 19	4,473 84
June 12,1907	Noble from 18 ft. e of w line of 6th St. to 13 ft. w of e line of Greenwood	218	6 in.	119 81	17 18	15 38	....	30 24	13 31	46 52	36 63	4793	10 90	260 89	598 79
Oct. 12, 1906	Otis from 237 ft. w of w line of Junction to 388 ft. e of w line of Greusel	297	6 in.	140 64	3 21	14 21	....	....	70	....	9 20	.....	14 85	110 50	293 31
Apr. 20,1907	Oakland from 45 ft. n of s line of Chicago Boulevard to 14 ft. n of s line of Belmont	971	10 in.												
	Also Boston Boulevard (s s) crossing Oakland	25	6 in.												
	Also Boston Boulevard (s s) crossing Oakland	25	6 in.												
	Also Chicago Boulevard (ss) crossing Oakland	27	6 in.												
	Also Lyon crossing Oakland	49	6 in.	1,111 24	46 35	87 13	....	101 26	12 43	107 95	18 88	.....	54 85	761 07	2,301 16
May 22,1907	Oak from 23 ft. e of w line of Clark to 2 ft. w of w line of Scotten	536	6 in.	300 65	13 58	35 88	....	25 22	9 14	21 71	5 00	.....	26 80	191 96	629 94
June 28,1907	Owen from 322 ft. e of e line of John R to 45 ft. e of e line of same	134	6 in.	75 73	1 75	7 38	....	....	1 97	....	4 00	.....	6 70	51 72	149 25
	Pumping Works connection to lake for Fountain	273	4 in.	89 90	10 85	17 94	....	20 20	3 09	21 04	....	.....	13 65	196 50	373 15
July 7, 1906	Pelouze from 39 ft. e of w line of Livernois to 172 ft. w of w line of Markey	1165	6 in.	550 26	12 49	50 82	....	24 90	9 04	21 49	20 63	....	58 25	245 00	993 13
July 14,1906	Perkins from 39 ft. e of e line of Livernois to 125 ft. w of w line of Gilbert	547	6 in.	258 08	12 04	23 10	....	24 90	7 52	21 18	5 83	.....	27 35	132 25	512 25

PIPE LAID FROM JULY 1st, 1906, TO JULY 1st, 1907.—CONTINUED.

Date.	LOCATION OF PIPE.	Feet.	Size.	COST OF CONSTRUCTION.											
				Pipe.	Specials.	Lead.	Gates.		Sundries.	Gatewell.	Hauling.	Repaving.	Sup. & Eng.	Labor.	Total Cost.
							No.	Cost.							
July 31,1906	Parker from 21 ft. s of n line of Hendrie to 314 ft. s of s line of same	353	6 in.	$166 22	$7 85	$18 95		$13 95	$1 40	$21 10	$7 63		$17 65	$119 03	$373 78
Nov. 10,1906	Palmer from 2 ft. e of e line of Moran to 251 ft. w of same	253	6 in.	133 06	5 74	14 23		24 90	4 55	21 16	5 50		12 65	62 92	284 71
Dec. 15,1906	Parker from 267 ft. n of n line of St. Paul to 407 ft. n of n line of same	140	6 in.	72 86	1 06	9 72			55		4 70		7 00	56 66	152 55
Dec. 21,1906	Pennsylvania from 38 ft. n of s line of Forest to 667 ft. n of n line of Moran	1,562	6 in.	822 62	16 92	58 32		24 90	8 20	20 92	28 89		78 10	422 25	1,481 12
Apr. 25,1907	Phelps from 42 ft. e of w line of Van Dyke to 40 ft. w of e line of Baldwin	542	6 in.	305 07	6 68	30 75		30 34	7 40	42 62	8 47		27 10	188 94	647 37
June 3, 1907	Parker from 405 ft. n of n line of St. Paul to 563 ft. n of n line of same	158	6 in.	89 29		7 81			55		2 00		7 90	59 23	166 78
June 12,1907	Putnam from 8 ft. w of e line of Maybury to 36 ft. e of w line of Lawton	464	6 in.	262 22		18 75		15 12	1 42	21 71	6 88		23 20	170 81	520 11
July 23,1906	Reeder from e line of Cavalry to 20 ft. w of e line of same	20	6 in.												
	Also Cavalry from n line of Reeder to 97 ft. n of n line of same	97	6 in.	55 41	4 91	8 25		13 95	2 46	23 43	6 81		5 85	41 93	163 00
Apr. 14,1907	Rohns from 111 ft. n of n line of Forest to 302 ft. s of s line of same	493	6 in.	277 48	4 05	29 06		15 12	2 17	24 29	9 05		24 65	149 00	534 87
May 23,1907	Russell from 35 ft. s of n line of Holbrook to 548 ft. n of n line of same	583	6 in.	327 27	13 10	34 38		25 22	9 16	20 71	5 76	5 14	29 15	164 11	634 50
June 6, 1907	Reissman from 21 ft. w of e line of Rademacher to 359 ft. e of e line of same	380	6 in.	213 05	8 75	20 50		25 22	5 80	21 16	7 00		19 00	85 34	405 82
June 4,1907	Rowan from 181 ft. e of e line of Green to 675 ft. e of e line of same	494	6 in.	277 48	5 68	20 50			1 60		10 50		24 70	208 72	549 18
July 31,1906	Stephens from 59 ft. n of n line of Lambert to 8 ft. s of n line of same	62	6 in.	29 36		2 75			56		3 63		3 10	29 50	68 90

Aug. 20,1906	Seyburn from 106 ft. n of n line of Durand to 17 ft. n of n line of Walnut	202	6 in											
	Also Walnut from 106 ft. e of e line of Seyburn to 31 ft. w of e line of same	137	6 in.	160 53	2 86	14 63	....	13 95	1 22	20 11	5 41	....	16 95	87 43	323 09
Aug. 23,1906	Sargent from 2 ft. w of e line of McDougall Boulevard to 170 ft. e of e line of same	172	6 in.	81 45	6 10	10 24	....	10 95	5 38	.....	3 66	....	8 60	80 08	206 46
Oct. 9, 1906	Stephens from 364 ft. n of n line of Gratiot to 641 ft. n of n line of same	277	6 in.	131 17	.....	11 84	..	....	47	....	4 02	....	13 85	85 37	246 72
Oct. 10,1906	Seyburn from 363 ft. s of s line of Forest to 394 ft. s of s line of same	31	6 in.	14 68	83	2 34	....	....	04	....	2 79	....	1 55	12 17	34 40
Oct. 15,1906	Stephens from 15 ft. n of s line of Gratiot to 773 ft. s of s line of same	788	6 in.	371 74	11 43	37 91	....	24 90	6 81	22 17	9 85	...	39 40	215 93	740 14
Nov. 10,1906	Seyburn from 63 ft s of s line of Canfield to 860 ft. s of s line of same including 23 ft. crossing Seyburn	252	6 in.	128 47	5 74	11 88	....	....	51	....	6 04	....	12 60	69 10	234 34
Nov. 6, 1906	Scovell from 27 ft. w of e line of Vinewood to e line of w Boulevard	350	8 in.	248 03	26 73	33 17	....	19 95	3 87	21 58	6 87	....	17 50	134 67	512 37
Nov. 27,1906	South from 19 ft. 6 in. e of w line of Artillery to 8 ft. 6 in. w of w line of same	28	12 in.	35 84	2 52	4 50	....	....	2 16	....	11 38	....	1 40	81 26	139 06
Nov. 24,1906	Sword from 28 ft. w of e line of Artillery to 292 ft. w of w line of same	330	6 in.	174 24	9 21	19 50	....	24 90	9 44	20 02	8 25	....	16 50	78 85	360 91
Dec. 22,1906	Stanley from 32 ft. w of e line of Stanton to 30 ft. e of w line of Linwood	385	12 in.	492 80	24 89	48 00	....	....	5 84	......	18 30	....	19 25	263 55	872 63
Jan. 11,1907	Sheridan from 50 ft. n of n line of Hendrie to 26 ft. 6 in. s of n line of Medbury	298	6 in.											
	Also Medbury from 24 ft. 6 in. e of w line of Sheridan to 20 ft. e of w line of Baldwin	643	8 in.											
	Also Townsend from 27 ft. s of n line of Medbury to 32 ft. s of n line of Hendrie	381	6 in.	827 44	21 04	82 62	....	67 80	14 96	99 66	20 72	....	66 10	521 40	1,721 74
Dec. 1906 to Jan. 15,1907	St. Aubin from 12 ft. n of s line of Clay to 160 ft. s of s line of same and from 18 ft. w of e line of St. Aubin to 38 ft. w of e line of same	6 192	6 in. 8 in.	155 44	27 99	33 00	....	30 75	6 25	Meter Wells & Repairs 294 71	43 75	14721 Concreting.	9 60	250 85	* 999 55
	Also St. Aubin from 15 ft. n of s line of Clay to 12 ft. n of n line of private way and from 15 ft. e of w line of St. Aubin to 22 ft. e of w line of same	200	10 in.	221 76	51 05	36 30	....	37 30	72 60	64 61	.	14 85	10 00	365 13	* 873 60

* $1873.15 less $43.90 for old material returned.—Net total $1829.25

PIPES LAID FROM JULY 1st, 1906 TO JULY 1st, 1907.—CONTINUED.

Date	LOCATION OF PIPE.	Feet.	Size.	COST OF CONSTRUCTION.											
				Pipe.	Specials.	Lead.	Gates.		Sundries.	Gate-well.	Hauling.	Repaving.	Sup. & Eng.	Labor.	Total Cost.
							No	Cost.							
May 4, 1907	Seyburn from 20 ft. n of n line of Walnut to 15 ft. n of s line of Charlevoix	11 95	6 in.	$ 674 19	$ 1 70	$ 41 00	....	$ 30 24	$ 2 56	$ 42 85	$ 18 53	.....	$ 59 75	$ 418 25	$1,289 07
May 14,1907	Stanton from 257 ft. s of s line of McGraw to 35 ft. n of s line of same	2 57	6 in.	141 85	10 73	10 25	. ..	25 22	5 25	44 07	8 41	.....	12 85	170 82	429 45
May 25,1907	Senator from 20 ft. w of e line of Lawndale to 559 ft. e of e line of same	5 79	6 in.	326 08	2 85	25 63	....	25 22	5 94	26 31	13 75	.....	28 95	175 40	630 13
May 29,1907	Seebalt from 21 ft. e of w line of Springwells to 186 ft. e of e line of same	2 31	6 in.	129 41	2 85	10 25	....	25 22	5 28	21 32	7 49	.....	11 55	70 71	284 08
June 14,1907	Steuben from 130 ft. s of s line of Devereux to 2 ft s of s line of same	1 28	6 in.	70 64	5 68	7 69	....	....	69	....	4 00	.....	6 40	47 27	142 37
June 15,1907	Sarvis Pl. from 13 ft. s of n line of Ingersoll to 207 ft. n of n line of same	2 20	6 in.	122 63	6 90	15 63	....	25 22	5 78	21 71	5 50	.....	11 00	83 48	297 85
June 11,1907	Sheridan from 17 ft. s of s line of Duncan to 20 ft. s of n line of same	47	6 in.												
	Also Duncan from 25 ft. e of w line of Sheridan to 31 ft. e of w line of Field	2 97	6 in.												
	Also Field from 69 ft. n of n line of Duncan to 552 ft. s of n line of Duncan	6 71	6 in.	570 78	23 53	56 25	....	55 46	9 34	68 90	17 88	....	50 75	318 85	1,171 74
May 31,1907	St. Aubin from 25 ft. n of s line of Macomb to 3 ft. s of s line of Champlain Also Macomb from 11 ft. e of w line of Orleans to 8 ft. w of e line of St. Aubin	7 10 10	10 in. 6 in.	764 10	49 00		....	S. S. & Valve &Well 165 90	14 00 69 41		120 00	.....	35 50	....	*1,217 91
		10 43	10 in.												
	Also Macomb from 8 ft. e of w line of St. Aubin to 1 ft. e of w line of same	9	4 in.	1120 71	91 08	179 38	....	S S. & Valve. 140 00	8 65	182 72	40 27	.....	52 60	1,741 06	*3,556 47
June 5, 1907	St. Antoine from 37 ft. n of s line of Kirby to 36 ft. s of s line of Farnsworth	6 90	8 in.	539 61											
	Also Kirby from e line to w line of same	53	6 in.	29 95	37 35	56 38	....	78 54	10 65	66 50	18 56	....	37 15	413 50	1,288 19

* Total—$ 4774.38

May 2 to June 27,1907	Stanley from 28 ft. w of e line of Wabash to 34 ft. w of e line of Stanton and from 29 ft. w of e line of Linwood to 37 ft. e of w line of Grand River	2,666	12 in.	5,370 37	114 05	442 68	....	296 32	230 79	437 72	280 66	35317	205 60	3 161 64	10,893 00
	Also Grand River from 23 ft. n of s line of Stanley to 172 ft. n of n line of Wreford	1,158	12 in.												
	Also Missouri from 12 ft. n of s line of Stanley to 82 ft. n of n line of same	130	6 in.												
	Also Winslow from 24 ft. s of n line of Stanley to 71 ft. n of n line of same	95	6 in.												
	Also Wreford from 12 in. pipe to e line of Grand River	63	6 in.												
July 18,1906	Thirty-third from 428 ft. n of n line of Horatio to 514 ft. n of n line of same	86	6 in.	40 73	....	4 63	....	. ....	17	....	3 16	.....	4 30	32 67	85 65
Aug. 13,1906	Thirty-first from 9 ft. n of n line of Warren to 545 ft. n of n line of same	637	6 in.	300 23	10 60	29 25	....	13 95	4 04	20 44	9 02	.....	31 85	237 17	656 55
Apr. 4, 1907	Thirty-third from 34 ft. 6 in. s of s line of Herbert to 130 ft. s of s line of same	96	6 in.	53 69	1 10	5 81	..	....	44	....	3 75	.....	4 80	25 42	95 01
May 1, 1907	Third St. from 27 ft. s of n line of Antonette to 19 ft. n of s line of Amsterdam	1,152	10 in.	1,330 29	65 38	102 50		125 41	18 20	131 12	35 16	.....	64 50	1,073 89	2,946 45
		34	12 in.												
		26	8 in.												
		78	6 in.												
May 11,1907	Thirtieth St. from s line of Warren to n line of same	100	6 in.	54 25	1 18	5 13	....	15 12	89	22 04	5 85	.....	5 00	105 77	215 23
May 15,1907	Twenty-fifth St. from 191 ft. s of n line of Merrick to 111 ft. s of n line of Kirby	565	6 in.	318 73	5 10	20 50	...	15 12	2 16	22 04	6 42	.....	28 25	246 47	664 79
May 27,1907	Thirtieth St. from 120 ft. n of n line of Rich to 153 ft. n of same	33	6 in	17 52	1 10	2 56	...	....	20	....	2 00	....	1 65	21 77	46 80
May 31,1907	Twenty-eighth from 11 ft. s of s line of McGraw to 20 ft. n of s line of same	137	6 in	166 71	10 23	15 38	....	15 12	2 15	21 64	7 34	.....	15 00	125 92	379 49
	Also McGraw from 35 ft. w of e line of 28th to 125 ft. e of e line of same	163	6 in.												
Aug. 7, 1907	Thirtieth from 155 ft. n of s line of Warren to 2 ft. s of s line of same	153	6 in.	72 45	....	5 85	..	....	38	....	4 19	....	7 65	52 69	143 21

PIPE LAID FROM JULY 1, 1906, TO JULY 1, 1907—CONTINUED.

Date.	LOCATION OF PIPE.	Feet.	Size.	COST OF CONSTRUCTION.											
				Pipe.	Specials.	Lead	Gates.		Sundries.	Gate-well	Hauling.	Re-paving.	Sup. & Eng.	Labor.	Total Cost.
							No.	Cost.							
July 27, 1906	Warren from 5 ft. w of w line of Ellery to 96 ft. e of w line of same	101	10 in.	$ 91 31	$ 12 53	$ 9 63	....	$	$ 68	$	$ 3 13	.....	$ 5 05	$ 55 96	$ 178 29
Aug. 7, 1906	Woodward, alley e of same crossing Woodbridge	18	4 in.	5 04	1 28	4 39	....	10 95	3 95	19 59	2 32	.	90	51 45	99 87
Oct. 20, 1906	West End St. from 20 ft. s of n line of Barnes to 425 ft. s of s line of same	450	6 in.	213 10	4 39	20 48	....	24 90	6 30	22 87	12 19	.....	22 50	86 81	413 54
Nov. 9, 1906	Warren from 26 ft. e of w line of Concord to 8 ft. w of e line of Bellevue	381	10 in.	381 02	24 89	37 91	....	24 90	2 58	41 50	6 52	.....	19 05	150 89	689 26
Nov. 7, 1906	Warren from 19 ft. e of w line of McDougall to 224 ft. e of e line of same	285	6 in.	149 95	1 76	14 22	..	13 95 S S & Valve	1 56	21 33	3 53	...	14 25	131 10	351 65
Dec. 31, 1906	Woodmere from 31 ft. s of n line of Fort to 463 ft. s of s line of same	534	8 in.	390 81	7 00	38 88	....	31 00 Gate 10 95	3 50	21 80	21 39	.....	26 70	203 62	755 65
Dec. 29, 1906	Waterloo from 9 ft. w of w line of Beaufait to 46 ft. e of e line of same	125	6 in.	63 36	2 86	7 32	....	27 90	2 21	35 73	2 50	.....	6 25	47 51	195 64
May 3, 1907	Warren from 20 ft. e of w line of 31st St. to 184 ft. w of w line of same	204	10 in.	211 46	16 60	20 50	....	38 05	7 98	23 04	9 63	.....	10 20	135 89	473 35
May 17, 1907	Wellington from 262 ft. e of e line of Greeley to 324 ft. e of e line of same	62	6 in.	35 04	....	3 13		......	26	....	1 00	.....	3 10	20 48	63 01
June 20, 1907	Wreford from e line of Grand River to 497 ft. e of e line of same....	497	6 in.	278 04	9 80	19 12	..	15 12	12 58	... ...	27 29	....	24 85	445 38	832 18
Oct. 23, 1906	Vermont from 25 ft. n of n line of Milwaukee to 277 ft. s of s line of same	302	6 in.	156 29	6 93	14 58	..	24 90	2 65	20 87	6 00	.	15 10	79 44	326 76

PIPE LAID OUTSIDE THE CITY FROM JULY 1st, 1906, TO JULY 1st, 1907.

Date.	LOCATION OF PIPE.	Feet.	Size.	COST OF CONSTRUCTION.											
				Pipe	Specials.	Lead	Gates. No.	Gates. Cost.	Sundries.	Gate-well.	Hauling.	Re-paving.	Sup. & Eng.	Labor.	Total Cost.
Aug. 4, 1906	Bewick from 2303 ft. n of n line of Kercheval to 3145 ft. n of n line of same	842	6 in.	$396 83	$8 80	$37 91	....	....	$1 76	....	$16 84	.....	$42 10	$187 98	$694 22*
Apr. 6, 1907	Connor Creek Rd. from 92 ft. s of n line of Jefferson to 45 ft. n of s line of Kercheval .... And Kercheval from 20 ft. 6 in. w of e line of Connors Creek Rd. to 693 ft. e of e line of same....	1,527 713	6 in 6 in.	1,382 71	46 09	118 47	....	$94 48	14 64	$61 00	45 61	....	112 00	729 28	2,604 28*
Apr. 16,1907	Beniteau from 584 ft. 6 in. n of n line of Kercheval to 2287 ft. n of n line of same	1,703	6 in	1,055 68	21 34	78 98	...	....	2 06	....	30 44	.....	85 15	540 18	1,813 83*
Jan. 19,1907	Fairview Ave. from 7 ft. n of n line of Edlie to 668 ft. s of s line of same	16 724	6 in 6 in.	380 69	12 13	34 02	....	Hyd. 32 50 Gt. 13 95	1 85	21 60	12 33	.....	36 20	267 82	813 09*
Jan. 31,1907	Fairview from 180 ft. n of n line of Kercheval to 1922 ft. n of n line of same	1,792	6 in.	942 74	17 48	83 62	....	....	3 48	....	37 75	.....	89 60	717 97	1,891 64*
Aug. 8, 1906	Glover from 77 ft. n of s line of Jefferson to 517 ft. s of n line of Edlie	1,405	6 in.	663 44	20 52	61 60	....	38 85	13 83	44 74	22 10	....	70 25	554 75	1,490 08*
Aug. 4, 1906	Garland from 985 ft. s of s line of Mack to 550 ft. s of s line of same	436	4 in.	122 00	10 62	17 55	....	....	1 66	.....	8 72	.....	21 80	122 93	305 28*
Aug. 21,1906	Gilbert from 57 ft. s of n line of Jefferson to 394 ft. n of n line of Kercheval	1,385	6 in.	653 97	20 05	71 08	..	38 85	12 09	44 02	26 89	.....	69 25	566 44	1,502 64*
Aug. 18,1906	Hart from 50 ft. s of n line of Jefferson to 338 ft. n of n line of Kercheval	1,335	6 in.	630 30	24 11	56 86	...	Hydts. 65 00 Gts 38 85	11 16	43 86	20 70	.....	66 75	555 25	1,512 84*
Apr. 16,1907	Hitchings from 87 ft. s of n line of Jefferson to 2181 ft. n of n line of same	2.268	6 in.	1 404 15	33 33	124 11	...	27 27	14 83	23 01	65 03	.....	113 40	698 92	2.504 52*
June 21,1907	Hamilton n of Jefferson	310	8 in	262 59	15 43	28 21	....	37 68	15 06	24 87	16 92	5 76	15 50	132 58	554 60†
Sept. 13,1906	Laclia from 186 ft. s of s line of Jefferson to 205 ft. s of s line of Edlie	846	6 in.	399 68	6 66	37 91	...	13 95	2 56	22 12	18 92	....	42 30	202 84	746 94‡
Sept 8, 1906	Lycasta from 69 ft. n of s line of Jefferson to 205 ft. s of s line of Edlie	1,104	6 in.	520 91	16 11	52 12	....	Hydt 65 00 Gts 38 85	16 06	44 57	16 08	....	55 20	417 25	1,242 15‡

* Fairview (now inc. in city). † Fairview, Jefferson Land Co. (now inc. in city). ‡ Fairview (now inc. in city).

PIPE LAID OUTSIDE THE CITY FROM JULY 1st, 1906 TO JULY 1st, 1907.—CONTINERD.

Date.	LOCATION OF PIPE.	Feet.	Size.	COST OF CONSTRUCTION.											
				Pipe	Spec-ials	Lead	Gates.		Sun-dries	Gate-well.	Haul-ing.	Re-pav-ing.	Sup. & Eng.	Labor.	Total Cost.
							No.	Cost.							
Jan. 17,1907	Lemay from 50 ft. s of s line of Jefferson to 671 ft. s of s line of Edlie	1,394	6 in.	732 34	$ 8 13	58 32	....	Hyd't 65 00 Gates 38 85	7 90	43 20	31 75	.....	69 70	576 80	1,631 99*
Apr. 23,1907	Phillys from 87 ft. s of n line of Jefferson to 2204 ft. n of n line of same	2,291	6 in.	1,416 90	40 10	135 40	....	27 74	14 19	23 01	48 37	.....	114 55	686 74	2,507 00*
Sept. 26,1906	St. Clair from 15 ft. n of s line of Kercheval to 1526 ft. n of n line of same	1.591	6 in.	752 00	12 40	71 08	....	24 90	7 83	22 12	23 87	.....	79 55	506 06	1.499 81*
Jan. 16,1907	St. Jean Rd. from 54 ft. s of n line of Jefferson to 523 ft. s of s line of Edlie	1,377	6 in.	724 94	21 94	58 32	....	37 85	14 61	41 00	28 25	.....	68 85	586 00	1,581 76*
Apr. 8, 1907	St. Jean from 58 ft. n of s line of Jefferson to n line of same; also from 135 ft. n of n line of Kercheval to 711 ft. n of n line of same	634	8 in.	545 98	23 93	76 78	....	11 11	8 26	48 40	15 89	.....	31 70	395 72	1,161 61*
July 13,1906	St. Jean from 2 ft. n of n line of Jefferson to 135 ft. n of n line of Kercheval	1,083	8 in.	935 10	10 07	108 77	....	53 14	7 40	....	58 62	....	54 15	931 28	2,158 53*
Apr. 21,1906	Taylor from 232 ft. n of n line of Kercheval to 1390 ft. n of n line of same	1,158	6 in.	717 46	16 31	62 06	....	....	1 95	....	15 69	....	57 90	360 80	1.235 17*
Jan. 17,1906	Taylor from 59 ft. n of s line of Edlie to 616 ft. s of s line of same	684	6 in.	355 87	3 69	29 16	....	Hyd't 32 50 Gates. 13 95	8 32	20 42	16 37	.....	34 20	324 52	839 00*
Apr. 1, 1906	Utica from 89 ft. s of n line of Jefferson to 2234 ft. n of n line of same	2,323	6 in.	1,436 79	40 10	135 40	...	27 74	14 49	23 23	41 79	.....	116 15	686 56	2 522 25*
July 18,1906	Bolton from 19 ft. s of n line of Mack to 811 ft. s of s line of same	54.6	6 in.	Old Pipe	7 61	....	....	13 95	46	21 40	55	....	2 73	14 85	61 55†
Sept. 6, 1906	Bolton from 7 ft. s of s line of Mack to 811 ft. s of s line of same	New 752 Old 52	6 in. 6 in.	355 64	7 40	28 43	....	10 95	6 44	....	16 08	.	40 20	203 66	668 80†
Sept, 15,1906	Fournier from 20 ft. s of n line of Mack to 620 ft. s of s line of same	669	6 in.	315 32	11 18	28 43	....	24 90	4 09	21 79	13 38	...	33 45	175 12	627 66†

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* Fairview, now incorporated in City.
† St. Clair Heights.

Sept. 6, 1906	Hance from 20 ft. s of n line of Mack to 1554 n of n line of same	1.564	6 in.	Old pipe.	9 77	14 22	....	10 95	7 20	21 31	15 64	....	78 20	403 52	561 31*
Sept. 20,1906	Hance from 1554 ft. n of n line of Mack to 2546 ft. n of n line of same	1,002	6 in.	473 55	7 13	42 65	...	....	2 91	.. ..	20 04	....	50 10	257 33	853 71*
July 27,1906	Mack from 1 ft. e of Hurlbut to 18 ft. w of e line of St. Jean Rd.	26.6 3,551	6 in. 12 in.	4,059 24	147 85	414 62	....	Hydr't 117 00 Gate 120 00	86 97	70 92	145 00	.....	178 90	1,865 94	7,206 44*
Sept. 14,1906	Mack from 20 ft. w of e line of St. Jean Rd. to 20 ft. w of e line of Fairview	262	12 in.	299 63	6 30	23 69	....	......	1 37	....	7 75	.....	13 10	83 43	435 27*
Sept. 10,1906	St. Clair from 43 ft. n of s line of Mack to 641 ft. s of s line of same	684	6 in.	320 12	5 74	23 69	...	10 95	7 05	21 81	13 68	.....	34 20	182 05	619 29*
Aug. 14,1906	Shoemaker from 20 ft. w of e line of St. Jean to 3 ft. e of e line of Montclair	1,746	8 in.	1,146 59	34 97	94 77	....	50 85	12 68	44 70	34 92	....	87 30	557 62	2,064 40*
July 27,1906	Sylvester from 20 ft. w of e line of St. Jean to 354 ft. e of e line of same	374	6 in.	Old Pipe.	2 63	....	....	10 95	2 80	21 88	3 74	.....	18 70	72 34	133 04*
Aug. 13,1906	St. Jean Rd. from 20 ft. s of n line of Mack to 20 ft. s of s line of Shoemaker ....old	new 4.429 236	8 in. 8 in.	2,783 65	33 68	255 88	....	59 85	17 14	67 05	89 30	.	223 25	1.168 84	4,698 64*
Jan. 8, 1907	Shoemaker from 2 ft. e of e line of Cadillac to 1262 ft. e of same and Cadillac from n line of Shoemaker to 20 ft. s of s line of same .... Also Shoemaker from 25 ft. e of w line of Cadillac to 2 ft. e of e line of same	1,260 20 49	8 in. 8 in. 10 in.	985 04	30 29	92 34	....	39 90	4 61	44 17	34 00	.....	66 45	531 50	1,828 30*
Aug. 13,1906	Goodson from 646 ft. e of e line of Jos. Campau to 892 ft. e of e line of same	246	6 in.	114 60	3 33	9 48	....	....	37	....	7 25	.....	12 30	40 26	187 59†
Oct. 13,1906	LeGrand from 25 ft. w of e line of Mt. Elliott to 545 ft. e of e line of same	570	6 in.	269 45	8 17	23 69	....	24 90	6 14	22 16	11 87	....	28 50	169 25	564 13†
June 30,1907	Jean Ave. from 5 ft. w of w line of alley w of Pennsylvania to 96 ft. w of w line of McCellan	242	6 in.	149 83	4 68	11 28	....	.... ..	1 51	....	7 51	....	12 10	78 27	265 18‡
June 26,1907	Campau from 12 ft. n of s line of Stuart to 88 ft. n of n line of same	126	6 in.	78 34	......	5 32	....	....	46	....	8 25	.....	6 30	34 83	133 50†
June 24,1907	Goodson from 890 ft. e of e line of Jos. Campau to 1276 ft. e of e line of same	386	6 in.	239 36	5 67	15 97	....	Hydr't 35 75 Gates 16 63	11 59	....	7 89	....	19.30	124 68	476 84†

* St. Clair Heights. † Hamtramck. ‡ Hamtramck, "Alfred Low."

PIPE LAID OUTSIDE THE CITY FROM JULY 1st, 1906 TO JULY 1st, 1907.—CONTINUED.

Date.	LOCATION OF PIPE.	Feet.	Size.	COST OF CONSTRUCTION. Pipe.	Specials.	Lead.	Gates. No.	Gates. Cost.	Sundries.	Gate well.	Hauling.	Repaving	Sup. & Eng.	Labor.	Total Cost.
June 26,1907	Norwalk from 20 ft. w of e line of Nall to 390 ft. e of e line of same	410	6 in.	$ 254 28	$ 9 10	$21 29	....	$ 27 74	$10 05	$ 22 79	$11 00	....	$20 50	$ 115 29	$492 04*
June 24,1907	Wyandotte from 19 ft. w of e line of Lampkin to 402 ft. e of e line of same	421	6 in.	260 50	8 17	21 29	....	44 37	11 49	22 72	9 00	.....	21 05	138 65	537 24*
Oct. 31,1906	Charlotte from 16 ft. e of w line of River to 389 ft. w of w line of same	425	6 in.	196 52	13 72	27 79	..	Hyd't 86 19 24 90	8 25	23 78	25 75	.....	20 25	150 03	577 18†
July 3, 1906	California from 16 ft. w of e line of Woodward to 211 ft. e of e line of same	227	6 in	106 55	12 40	13 86	....	24 90	6 04	21 12	10 75	.....	11 35	86 75	293 72‡
Aug. 28,1906	Connecticut from 16 ft. w of e line of Woodward to 152 ft. e of e line of Brush	1962	6 in.	923 42	23 78	85 29	....	38 85	8 97	41 78	31 00	.....	98 10	604 29	1855 48‡
Oct. 30,1906	Currystone from 11 ft. e of w line of John R to 1339 ft. e of e line of same	1388	6 in.	730 75	9 99	61 60	....	24 90	5 80	21 60	21 13	.....	69 40	386 07	1331 24‡
Nov. 1, 1906	Beresford from 16 ft. w of e line of Woodward to 836 ft. e of e line of John R	1832	6 in.	965 71	16 70	37 91	....	Hyd't 162 50 Gates 24 90	9 83	21 28	24 38	.....	91 60	415 25	1770 06‡
Dec. 17,1906	Tyler from 16 ft. w of e line of Woodward to 108 ft. w of w line of Second Ave														
	Furnished by Highland Park......	685	6 in	....	. ...	. ...	..	....	....	....	....	...	......	....	....
	Furnished by Water Board	538	6 in.	281 95	11 57	63 00	...	38 85	20 00	42 70	28 56	.....	61 15	568 35	1116 13‡

* Hamtranch "Alfred Low" † Ecorse ‡ Highland Park

SUMMARY OF THE AMOUNT OF PIPE LAID INSIDE THE CITY OF DETROIT AND OUTSIDE VILLAGES, FROM JULY 1st, 1906, TO JULY 1st, 1907.

LOCATION OF PIPE.	Feet	Size.	COST OF CONSTRUCTION										
			Pipe.	Specials.	Lead.	Gates.	Sundries	Gatewell	Hauling.	Re-paving	Sup. & Eng.	Labor.	Total Cost.
City of Detroit................	300 69,239 12,138 11,198 9,594 69 279	4 in. 6 in. 8 in. 10 in. 12 in. 30 in. 36 in.	$71,725 19	$3,230 23	$6,662 47	$7,578 23	$1,993 69	$7,133 47	$2,900 37	1,238 69	$5,139 90	$48,541 21	$156,144 43
Total..........	102,817												
Village of Fairview .... (now included in city pipeage	436 26,478 2,074	4 in. 6 in. 8 in.	16,423 07	429 34	1,536 73	838 48	125 99	551 17	618 43	9 60	1,446 25	10,753 67	$32,813 23
Total..........	28,941												
Village of St. Clair Heights..	5,176 7,491 49 3,818	4 in. 8 in. 10 in. 12 in.	10,738 78	304 55	1,018 72	470 25	154 22	334 93	394 18	....	826 58	5,516 20	$19,758 41
Total............	16 531	.. ....											
Village of Hamtramck..........	2,401	6 in.	1,366 36	39 12	108 32	149 39	41 61	67 67	62 77	....	120 05	701 23	$2,656 52
Village of Ecorse................	425	6 in.	196 52	13 72	27 79	111 09	8 25	23 78	25 75	....	20 25	150 03	$577 18
Village of Highland Park......	119	6 in.	3,000 38	74 44	261 66	314 90	50 64	148 48	116 02	.. ..	331 40	2,060 71	$6,366 63

RECAPITULATION OF CONSTRUCTION

TOTAL PIPE LAID, GATES SET AND WELLS BUILT

	FEET	COST	TOTAL
City of Detroit................	102,817	$156,144 43	
Village of Fairview............	28,941	32,813 23	
Village of St. Clair Heights....	16,531	19,758 41	
Village of Hamtramck.........	2,401	2,656 52	
Village of Ecorse..............	425	577 18	
Village of Highland Park......	6,632	6,366 63	
	157,747		
	29 $\frac{4627}{5280}$ miles		$218,316 40
Gates set over old lines.........		246 26	
Gate wells built over old lines..		772 01	1,018 27
Grand Total........			$219,334 67

Respectfully Submitted,

ANTHONY F. DIERKES,

SUPT. OF CONSTRUCTION.

SUPPLEMENT.

BOARD OF MANAGEMENT OF DETROIT WATER WORKS.

Board of Trustees appointed by Common Council, February 24th, 1852; organized March 1st, 1852.

Shubael Conant, Chairman. Edmund A. Brush.
Henry Ledyard. Wm. R. Noyes.
Jas. A. Van Dyke.

1853.

On the 16th of May, 1853, the Board of Water Commissioners of the City of Detroit was organized under an act previously approved by the Common Council and passed by the Legislature, February 14th, 1853. The term of service was determined by lot, as follows:

Jas. A. Van Dyke,	for 3 years.
Edmund A. Brush,	for 4 years.
Henry Ledyard,	for 5 years.
Shubael Conant,	for 6 years.
Wm. R. Noyes,	for 7 years.

Shubael Conant was elected President, who, finding the duties too arduous, resigned July 30th, and Edmund A. Brush was elected.

1854.

Edmund A. Brush, President. Jas. A. Van Dyke.
Shubael Conant. Wm. R. Noyes.
Henry Ledyard.

1855.

Edmund A. Brush, President.
Henry Ledyard.
Shubael Conant.
William R. Noyes.
James A. Van Dyke, died May 8th.
A. D. Fraser, appointed to fill vacancy.

1856.

Edmund A. Brush, President.
Shubael Conant.
Wm. R. Noyes.
Alexander D. Fraser, re-appointed May 1st, for 5 years
Henry Ledyard.

1857.

Edmund A. Brush, President, re-appointed May 1st, for 5 years.
Henry Ledyard.
Alexander D. Fraser.
William R. Noyes.
Shubael Conant.

1858.

Edmund A. Brush, President.
Shubael Conant.
Alexander D. Fraser.
Henry Ledyard, re-appointed May 1st, for 5 years.
Wm. R. Noyes.

1859.

Edmund A. Brush, President.
Alexander D. Fraser.
Wm. R. Noyes.
Shubael Conant, term expired May 1st, and
Julius D. Morton, appointed for 5 years.
Henry Ledyard, vacated by moval from city, and
John V. Ruehle, appointed May 1st to fill vacancy.

1860.

Edmund A. Brush, President.
Alexander D. Fraser.
Julius D. Morton.
William R. Noyes, re-appointed May 1st, for 5 years.
John V. Ruehle.

1861.

Edmund A. Brush, President.
Alexander D. Fraser, re-appointed May 1st for 5 years.
Jno. V. Ruehle, resigned Sept. 16th, and
Chauncey Hurlbut appointed to fill vacancy.

1862.

Edmund A. Brush, President, re-appointed May 1st, for 5 years.
Wm. R. Noyes.
Julius D. Morton.
Chauncey Hurlbut.
Alexander D. Frazer.

1863.

Edmund A. Brush, President.
Alexander D. Frazer.
Wm. R. Noyes.
Julius D. Morton.
Chauncey Hurlbut, term expired May 1st, and
Stanley G. Wight, appointed for 5 years.

1864.

Edmund A. Brush, President.
Alexander D. Frazer.
Wm. R. Noyes.
Julius D. Morton, term expired May 1st.
Stanley G. Wight.

1865.

Edmund A. Brush, President.
Wm. R. Noyes, resigned Jan. 10, and Jacob S. Farrand appointed to fill vacancy. Term expired May 1st. Re-appointed for 5 years.
Alexander D. Frazer.
Stanley G. Wight.
Julius D. Morton, re-appointed for 5 years from May 1st, 1864. Died Feb. 1865, and
Jno. Owen appointed to fill vacancy.

1866.

Edmund A. Brush, President.
Alexander D. Fraser, re-appointed May 1, for 5 years.
Stanley G. Wight.
Jacob S. Farrand.
Jno. Owen.

1867.

Edmund A. Brush, President, re-appointed May 1, for 5 years.

Alexander D. Fraser.

Jacob S. Farrand.

Jno. Owen.

Stanley G. Wight.

1868.

*Edmund A. Brush, President.

Stanley G. Wight, term expired May 1, and

Chauncey Hurlbut appointed for 5 years.

Jacob S. Farrand.

John Owen.

Caleb Van Husan.

*Edmund A. Brush resigned January 28, and Caleb Van Husan appointed to fill vacancy, and Alexander D. Fraser elected President.

1869.

Alexander D. Fraser, President.

John Owen, re-appointed May 1, for 5 years.

Jacob S. Farrand.

Caleb Van Husan.

Chauncey Hurlbut.

1870.

Alex. D. Fraser, President.

Jacob S. Farrand, re-appointed May 1, for 5 years.

Jno. Owen.

Caleb Van Husan.

Chauncey Hurlbut.

1871.

*Alex. D. Fraser, President.

Jacob S. Farrand.

Caleb Van Husan.

Chauncey Hurlbut.

John Owen.

*Term expired May 1, and Samuel F. Hodge appointed for 5 years. Jacob S. Farrand elected President.

1872.

Jacob S. Farrand, President.

Jno. Owen.

*Caleb Van Husan.

*Samuel F. Hodge.

Chauncey Hurlbut.

*Term expired May 1st, and Elija Smith appointed for 5 years.

1873.

*Chauncey Hurlbut, President. Jacob S. Farrand.
Jno. Owen. Samuel F. Hodge.
Elija Smith.

*Term expired and re-appointed. Elected President, May, 1872.

1874.

Chauncey Hurlbut, President. Jacob S. Farrand.
*Jno. Owen. Samuel F. Hodge.
Elija Smith.

*Term expired and re-appointed.

1875.

Chauncey Hurlbut, President. *Jacob S. Farrand.
Jno. Owen. Samuel F. Hodge.
Elija Smith.

*Term expired and re-appointed.

1876.

Chauncey Hurlbut, President. Jacob S. Farrand.
Jno. Owen. *Samuel F. Hodge.
Elija Smith.

*Term expired and re-appointed.

1877.

Chauncey Hurlbut, President. Jacob S. Farrand.
Jno. Owen. Samuel F. Hodge.
*Michael Martz.

*Elija Smith's term expired and Michael Martz appointed to fill vacancy.

1878.

*Chauncey Hurlbut, President. Jacob S. Farrand.
Jno. Owen. Samuel F. Hodge.
Michael Martz.

*Term expired and re-appointed.

1879.

Chauncey Hurlbut, President. Jacob S. Farrand.
Michael Martz. *Jas. Beatty.
*Jno. Pridgeon.

***Jno. Owen's term expired and John Pridgeon appointed to fill vacancy. Samuel F. Hodge resigned and Jas. Beatty appointed to fill vacancy.**

1880.

Chauncey Hurlbut, President. *Jacob S. Farrand.
Michael Martz. Jas. Beatty.
Jno. Pridgeon.

***Term expired and re-appointed.**

1881.

Chauncey Hurlbut, President. Jacob S. Farrand.
Michael Martz. *Jas. Beatty.
Jno. Pridgeon.

***Term expired and re-appointed.**

1882.

Chauncey Hurlbut, President. Jacob S. Farrand.
*Michael Martz. Jas. Beatty.
Jno. Pridgeon.

***Term expired and re-appointed.**

1883.

*Chauncey Hurlbut, President. Jacob S. Farrand.
Michael Martz. Jas. Beatty.
Jno. Pridgeon.

***Term expired and re-appointed.**

1884.

Chauncey Hurlbut, President. Jacob S. Farrand.
Michael Martz. Jas. Beatty.
*Jno. Pridgeon.

***Term expired, and Marshall H. Godfrey appointed**

1885.

*Jacob S. Farrand, President. Michael Martz.
Marshall H. Godfrey. *Edwin F. Conely.
*Samuel G. Caskey.

*Jas. Beatty died and Edwin F. Conely appointed to fill vacancy.
*Chauncey Hurlbut died and Samuel G. Caskey appointed to fill vacancy.
*Jacob S. Farrand's term expired and re-appointed.

1886.

Jacob S. Farrand, President. Michael Martz.
Marshall H. Godfrey. *Jno. Pridgeon.
Samuel G. Caskey.

*Edwin F. Conely's term expired and Jno. Pridgeon appointed to fill vacancy.

1887.

Jacob S. Farrand, President. Jno. Pridgeon.
Marshall H. Godfrey. Samuel G. Caskey.
*Joseph Nagel.

*Michael Martz term expired and Joseph Nagel appointed to fill vacancy.

1888.

Jacob S. Farrand, President. Jno. Pridgeon.
Marshall H. Godfrey. *Samuel G. Caskey.
Joseph Nagel.

*Term expired and re-appointed.

1889.

Jacob S. Farrand, President. Jno. Pridgeon.
Samuel G. Caskey. Jos. Nagel.
*August Goebel.

*Marshall H. Godfrey resigned January 1, 1889. August Goebel appointed to fill vacancy. Term expired May 1st, and re-appointed.

1890.

Jno. Pridgeon, President. August Goebel.
Joseph Nagel. *Henry M. Duffield.
Samuel G. Caskey.

*Jacob S. Farrand's term expired, and Col. Duffield was appointed to fill vacancy July 9th, 1890; John Pridgeon resigned as President of the Board, on account of ill-health, and Henry M. Duffield was elected to fill vacancy.

1891.

Henry M. Duffield, President. *Jno. Pridgeon.
August Goebel. Samuel G. Caskey.
Joseph L. Hudson.

*John Pridgeon's term expired May 1st, and Frank E. Kirby was appointed for a term of 5 years.

1892.

Samuel G. Caskey, President. Henry M. Duffield.
August Goebel. Joseph L. Hudson.
Frank E. Kirby.

1893.

August Goebel, President. Samuel G. Caskey.
Frank E. Kirby. Henry M. Duffield.
Joseph L. Hudson.

1894.

Henry M. Duffield, President. Frank E. Kirby.
Albert L. Stephens. De Witt H. Moreland.
Edward W. Pendleton.

A. L. Stephens appointed to succeed J. L. Hudson.
D. W. H. Moreland appointed to succeed S. G. Caskey.
Clarence A. Black appointed to succeed August Goebel.
C. A. Black resigned and E. W. Pendleton appointed to succeed him from Dec, 1.

1895.

Frank E. Kirby, President. Albert L. Stephens.
DeWitt H. Moreland. Edward W. Pendleton.
Darius D. Thorp.

1896.

Albert L. Stephens, President.
Edward W. Pendleton.
John P. Huckestein.
Darius D. Thorp.
John W. McGrath.

D. W. H. Moreland resigned to accept Commissionership on Board of Public Works, and J. P. Huckestein was appointed to fill vacancy.

Frank E. Kirby's term expired and J. W. McGrath was appointed to succeed him.

1897.

Edward W. Pendleton, President.
Darius D. Thorp.
James W. Millen.
John W. McGrath.
August Goebel.

August Goebel, appointed to succeed A. L. Stephens. Resigned January 1, 1898 and Joseph J. Noeker was appointed to fill vacancy.

John P. Huckestein resigned and James W. Millen was appointed to fill vacancy.

1898.

Edward W. Pendleton, President.
Joseph J. Noeker.
John W. McGrath.
Darius D. Thorp.
James Meathe.

1899.

Darius D. Thorp, President.
John W. McGrath.
Joseph J. Noeker.
*James Meathe.
Edward W. Pendleton.

***James Meathe died September 21st, 1899, and Benjamin Guiney was appointed to fill vacancy.**

1900.

John W. McGrath, President.
Joseph J. Noeker.
*Benjamin Guiney.
Edward W. Pendleton.
Darius D. Thorp.

Benjamin Guiney resigned, and John Zynda was appointed to fill vacancy.

1901.

Joseph J. Noeker, President.
John Zynda.
Edward W. Pendleton.
Darius D. Thorp.
Joseph J. Crowley.

1902.

John Zynda, President.
Edward W. Pendleton.
Darius D. Thorp.
Joseph J. Crowley.
John Schroeder.

1903.

Edward W. Pendleton, President.
Darius D. Thorp.
Joseph J. Crowley.
John Schroeder.
John Zynda.

1904.

Darius D. Thorp, President.
Joseph J. Crowley.
John Schroeder.
John Zynda.
Edward W. Pendleton.

1905.

Joseph J. Crowley, President.
John Zynda.
John Schroeder
Edward W. Pendleton.
John F. Dodge.

1906.

John Schroeder, President.
Edward W. Pendleton.
John Zynda.
John F. Dodge.
Frederick J. Clippert.

1907.

John Zynda, President.
John F. Dodge.
Edward W. Pendleton.
Frederick J. Clippert.
James H. Pound.

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FIFTY-SIXTH
ANNUAL REPORT
OF THE
BOARD OF WATER COMMISSIONERS

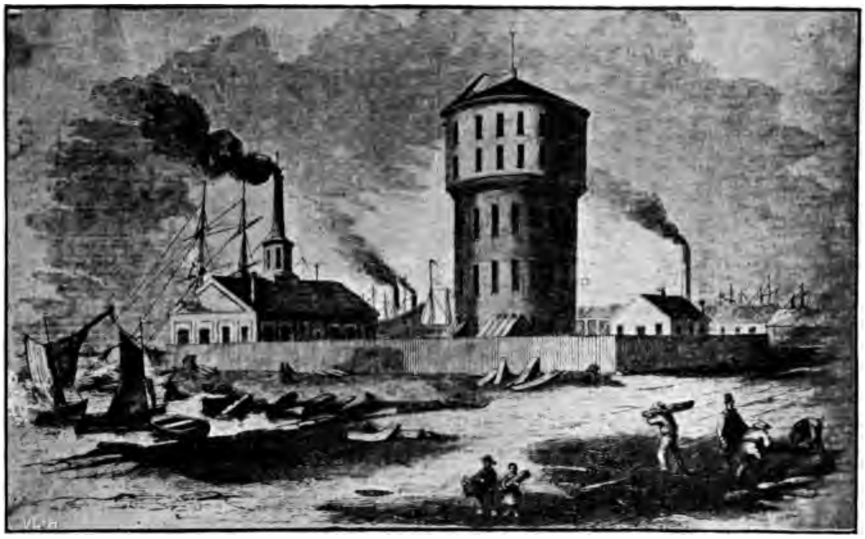
WATER WORKS

TO THE

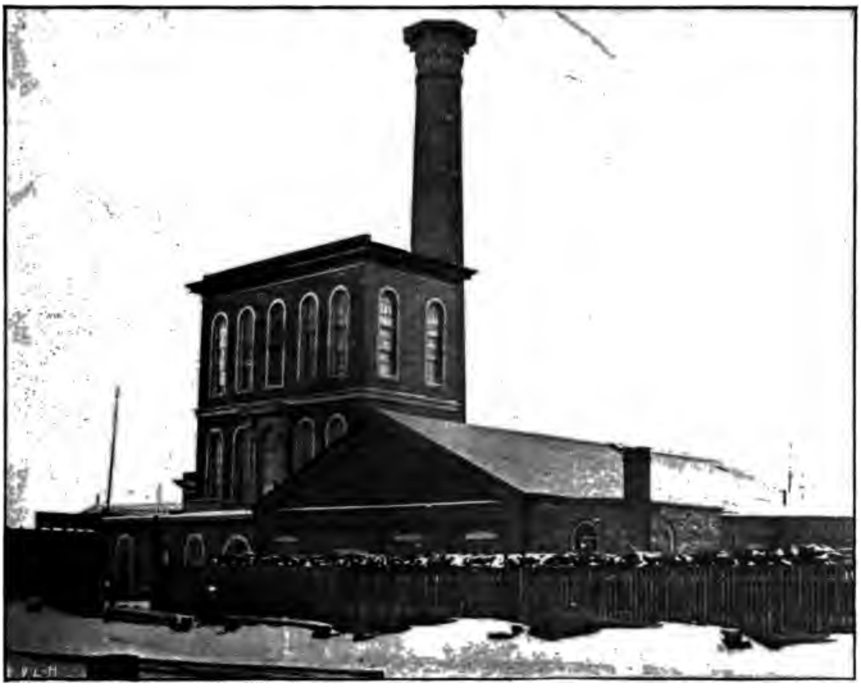
COMMON COUNCIL OF THE CITY OF DETROIT

FOR YEAR
ENDING JUNE 30TH

1908



1848-1858



1858-1874

FIFTY-SIXTH ANNUAL REPORT

OF THE

[illegible] Board of Water Commissioners

OF THE CITY OF DETROIT

TO THE

Common Council of the City of Detroit

TOGETHER WITH THE

Reports of the Officers of the Board

For Year Ending June 30th, 1908.

THOS. SMITH PRESS
DETROIT

CONTENTS.

Page

Report of the Commissioners 7

Financial Report of the Secretary 14

Report of the General Manager 31

Report of the Civil Engineer 37

Summary of Statistics 86

Report of Superintendent of Meters and Inspection 90

Report of the Chief Engineer at Pumping Works 96

Supplement 101

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Gift
City Board
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BOARD OF WATER COMMISSIONERS
OF THE
CITY OF DETROIT

MEMBERS:

EDWARD W. PENDLETON, 1909
FREDERIC J. CLIPPERT, 1911
JOHN F. DODGE, 1910
JAMES H. POUND, 1912
BASIL A. LEMKE, 1913

COMMITTEES:

Ways and Means	Commissioners POUND, LEMKE
Extension and Construction,	Commissioners DODGE, CLIPPERT.
Pumping Works	Commissioners CLIPPERT, DODGE
Supplies	Commissioners LEMKE, POUND

The President is ex-officio member of each committee.

OFFICERS:

President,	EDWARD W. PENDLETON
Vice-President,	JOHN F. DODGE
General Manager,	H. S. STARKEY
Secretary,	BENJ. F. GUINEY
Supt. of Meters and Inspection	THOMAS R. PUTNAM
Civil Engineer	GEORGE H. FENKELL
Chief Engineer at Pumping Works	URIAH GOULD
Superintendent of Construction	ANTHONY F. DIERKES
Bookkeeper	W. W. WILCOX
Receiving Clerk	GEORGE E. KUNZE
Cashiers	D. C. GROBBEL CHARLES W. KEENA
Meter Clerks	W. W. COONEY CHAS F. GILMER
Permit Clerk	GEO BARRIE
Collectors	FRANK PETZ ALBERT L. STADLER ANTHONY VOGEL GEO. G. SCOTT WM. COSGROVE JOHN J. ROBINSON M. A. DETTLING THOMAS J. CLANCY JOHN C BECKER GEO. P. MOOG

THE BOARD OF WATER COMMISSIONERS

OF THE

CITY OF DETROIT

RATES JULY 1, 1908

Payable Quarterly.	Quarterly
First 30,000 gals	$1 75
All in excess of 30,000 gals	2¼ cts. per M.
Minimum Rate	1 75

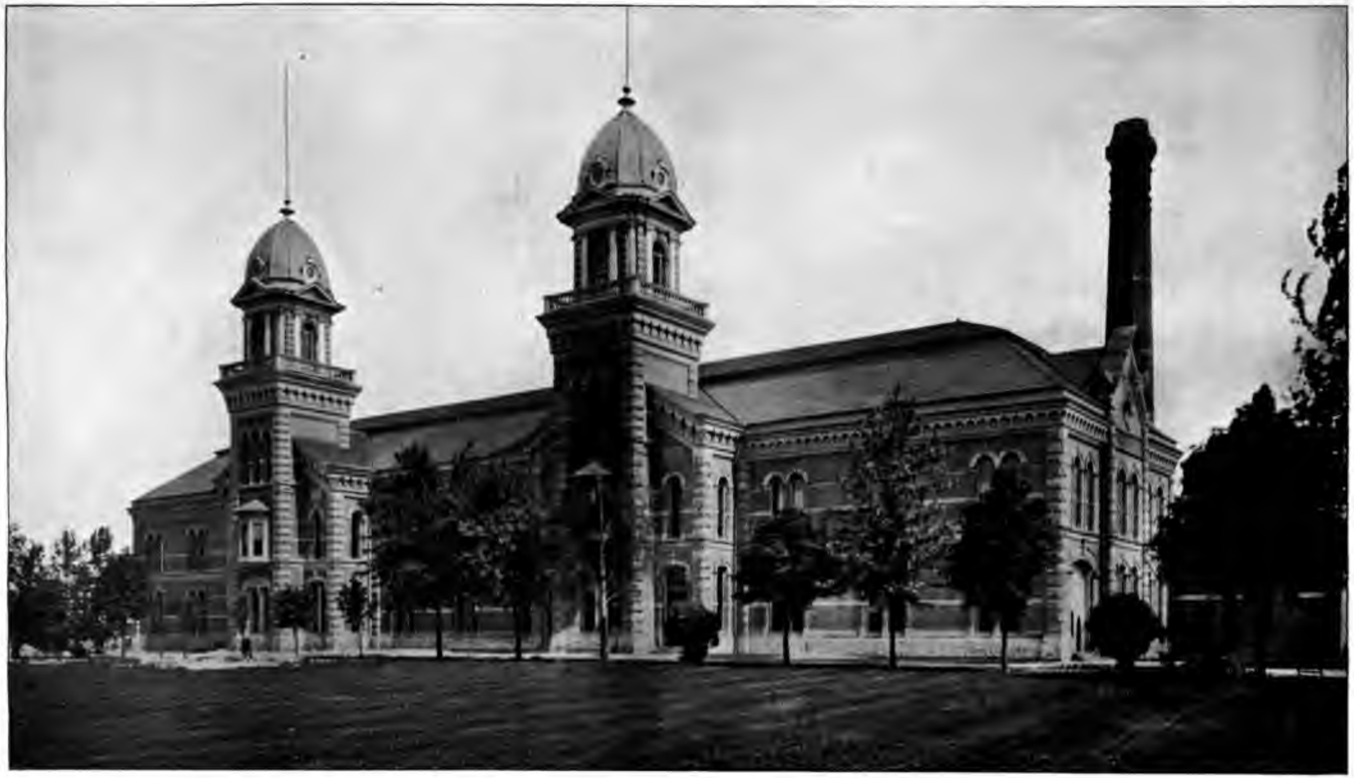
ASSESSMENT RATES

	Per Annum
For Family, household purposes	$2 60
Additional Families to first, in same house supplied through same faucet each family	1 40
Green Houses.—Special rates.	
Private Stable, for each horse	1 20
Livery Stables, " " "	1 20
Dray and Team Horses, each	60
Cows, each	60
Stores and Offices, from	$1 00 to 12 00
Bakeries, average daily use for each barrel of flour	2 00
Groceries and Provision Stores, from	$3 00 to 50 00
Saloons, from	6 00 to 50 00
Bar, with faucet, from	8 00 to 50 00
Fish Houses, from	6 00 to 50 00
Beer Pump	2 00
Barber Shops, each chair	2 00
Slaughter Houses.—Special rates.	
Hotels and Taverns, in addition to family rate, each room	60
Boarding Schools, from	$4 00 to 50 00
Printing Offices.—Special rates.	
Butcher Stalls, each not less than	3 00
Workshops, for 10 persons or under	3 00
" for each additional 10 persons	1 00
Boarding Houses, in addition to family rate, each boarder or roomer	40
Estimated quantities of water each 1,000 gallons	07
Building Purposes, each 1 M brick	03
" " " 100 yards plastering	05
" " " perch stone	01
" " minimum	50

FIXTURES

Bath Tub, for families, 1st tub	$ 1 00
" " each additional tub	60
" " public, each tub	4 00
Automatic Water Closets, for family, 1st closet	1 60
" " " each additional	60
" " " for hotels, stores, factories, etc., for 10 persons.	2 00
" " " each additional person	20
Rod Water Closets, not less than	6 00
Urinals, not less than	2 00
Wash Hand Basins, for family, each	48
" " " for other purposes, each person	15
Hose Bib or Connection, premises 30 feet front or less	60
" " " " 30 feet to 60 feet	80
" " " " 60 feet to 100 feet	1 60
Special Rates for larger grounds.	
Fountains	$5 00 to 20 00
Street Sprinklers, each wagon	50 00

Where there is a waste of water an increase of rates will be made.



1903

ANNUAL REPORT
OF THE
BOARD OF WATER COMMISSIONERS
OF THE
CITY OF DETROIT
JULY 1, 1907—JULY 1, 1908.

TO THE HONORABLE
The Common Council of the City of Detroit:

Gentlemen:—In accordance with the law, also an approved custom of the city, we herewith present to your Honorable Body our report of our doings, and the work of this commission for the year that has elapsed prior to the last fiscal rest, July 1st, 1908.

An inspection of our report will show that the year has been an extremely busy one, of great utility, made so in an endeavor upon our part to not only keep abreast of the constant demands made upon this department for increased mediums of water distribution, as well as added claims upon our water supply, but in an endeavor also to provide as far as human fore-sight can, for the immediate and remote future of the water supply of this rapidly growing city.

We must provide the water for fire protection and manufacturers' use, as well as for home and domestic consumption. The reports of our various subordinates hereto attached show what immense quantities of water is absolutely necessary to be provided for the city's daily use, and it is our business not only to advise your Honorable Body of our doings, but also to advise you of our plans and schemes, including our work, having the end in view to meet all demands upon us not only at the present, but to provide also fully for the future. Our capacity is now nearly exhausted, and indeed the season just passed has witnessed many complaints of insufficient pressure. This has been for about a month during the extremely hot weather, and while we do not concede the justice entirely of the complaints, it is a note of warning to us to provide enlarged pumping facilities to supply the wants of our citizenship.

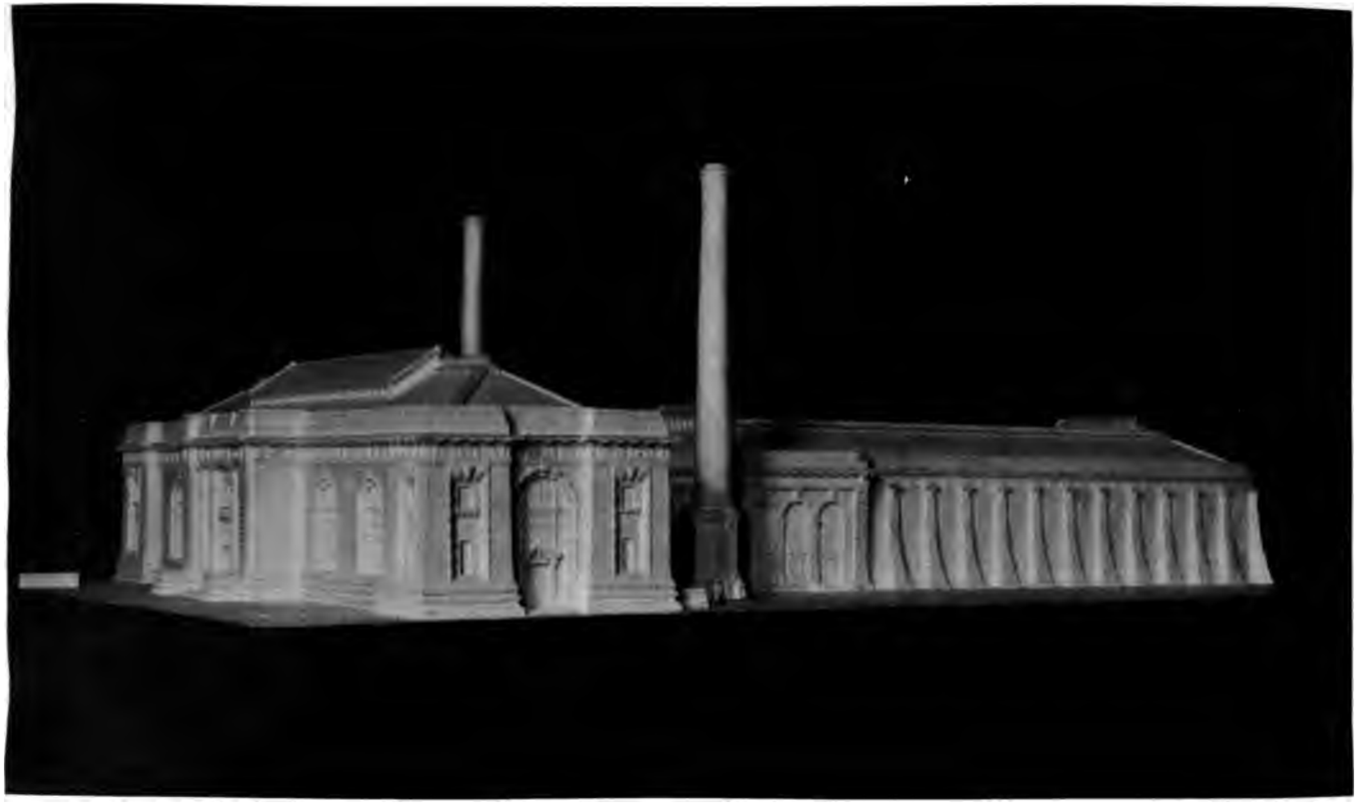
We believe, that situated as we are on the banks of one of the most beautiful streams of water in the world, our citizens are entitled to a most generous use of the water which flows by our door, and which we are assured there is none better in the world, nor on the whole furnished at less expense to the citizen.

A great initiator of the work of this department is the fire department. Indeed all our work is dependent upon our own judgement aided by the demands of citizens on this department, with all of which claims, where reasonable, we seek to comply. But it is with the fire department that this Board comes in most frequent contact of all the city's departmental agencies whose efforts to guard against conflagrations demands and receives our most hearty co-operation and assistance. This duty we recognize and cheerfully give after attending to domestic consumption. The demands of our fire department for additional water mains to be laid by this department have been many and costly the past year, as will appear by the pipage laid at their request, and as is shown in the subsidiary reports hereto included. Indeed in our own judgment most all of the demands of the fire department for pipage have been reasonable and granted by this Board with alacrity and pleasure. We believe that we have worked in the utmost harmony with this great agency.

The rapid and prodigious growth of this city has been such as is known to you all, but it has taxed the energies and the funds of this department to the uttermost to keep pace therewith. But so far, at least, we have a conscious feeling of having been able to be ahead of every contingency which has arisen. This brings us to the many and numerous manufacturing enterprises that have grown up in or been transplanted to this city in the last decade. We have deemed it an important part of our duty to see that every consideration is given to their demand for large quantities of water, and this conception of its duty has prompted this Board to lay a large 42 inch water main from Vinewood Avenue and Fort street, west on Fort street to Campau street; thence south on Campau to Jefferson Avenue west, thence west and south along Jefferson Avenue, first to Artillery Avenue, and second to Solvay Avenue, to provide the great factories lying contiguous thereto amply with water. And we beg to inform your Honorable Body that we intend, in the next and succeeding years, to drive this main still further along said avenue almost to the River Rouge and then in a westerly direction near to the River Rouge, on streets to be selected, until it will reach Fort street again, so as to provide an abundance of water for this factory district and for all the manufactories in this district, and for the use of those which will be located there for years to come. These enterprises of so much importance to this city in furnishing bread through employment to its citizens will be in nowise impeded by this Board by any act of omission of ours in the performance of our duty.

Again we inform you officially, of what you already know individually, that it is the purpose of this Board and that we are working at the laying of a great trunk line of pipe, four feet in diameter, which starts at the Water Works Pumping Station, and will traverse Bewick, Kercheval, and Holcomb Avenues and Waterloo and High and other streets and progress west at least to Vinewood Avenue, a distance of approximately seven miles. The purpose of which is to fortify with an abundance of water this great residential section of this city, so as to be amply prepared for any emergency.

We also beg to apprise your Honorable Body of the fact that we are alive to the stupendous growth in manufactures and residences of that portion of our city, known as the north Woodward, East District, and that we also have adopted a plan whereby we intend to drive a four foot main from the Water Works by convenient streets to the extreme northerly limits of the city, somewhere near Oakland Avenue. That in our opinion this work is not only necessary, but imperatively demanded by the city's growth. That the estimated cost of this last line alone will be above Nine Hundred Thousand Dollars, and that the money we are disbursing upon the other trunk mains will in the future with the north Woodward Avenue Main, involve a cost of about Three Million Dollars. But we are also convinced that as eternal vigilance is the price of liberty, so constant and indefatigable and intelligent work and labor in internal improvements, as well as a suitable location, is the requisite of a healthy, beautiful, progressive and great city. That the cities that have most appealed to the world and whose records have been and are the most useful and glorious, are those in which the largest civil enterprises have been successfully carried out by the respective cities' sons. And while we contemplate no artificial lakes, as Claudius made, still we believe that the responsibility of our office demands all our alertness to provide not only for the furnishing of an ample present supply of water for the present generation, but that we should try to look long into the future in making our provisions and plans: and that we should attempt so far as mortal eye can pierce the veil, (and judging as all wise men do by reason and experience) to provide against future demands as far as mortal fore-sight may.



PHOTOGRAPH FROM MODEL OF PROPOSED PUMPING STATION

Our predecessors on this Board in putting down hemlock logs, for water transportation, doubtless were making use of the best medium of underground water carriage then known, and we in using four foot iron pipes are but doing the same. They were, as we are, but mortal, and as such not impeccable. But our own experience has taught us, in the taking up of iron pipe laid nearly fifty years ago in the block bounded by Adams, Woodward, Elizabeth, and Park St. that iron pipe is practically indestructible underground when affected by no deleterious agents, such as contamination by electricity. This demonstrates the wisdom of the innovators on this Board who formerly fought to substitute iron for wood pipage.

We further report that we have had this year but little trouble from bursts attributable to electrolysis, although the lack of cohesion in the grain of iron pipe subjected to this weakening process or strain prompts this Board to a policy of avoiding avenues or streets, burdened with electrical car carriage therein, in the carrying of large trunk water lines where possible.

We also call attention of your Honorable Body to the fact that now the capacity of our engines and Pumping Station is on days of strain, almost, if not fully, exhausted, and that we are of the opinion that at the present rate of the city's growth if we did not make provision for it, we should undergo a water famine, more or less extended, in the near future. This we deem it to be but the part of prudence to endeavor to avoid. We have therefore committed ourselves to the building of another Pumping Station with an independent equipment rather than at the present time installing other engines in the present Pumping Station building, the object being apparent, to minimize the consequences of any serious breakdown. A picture of our new proposed Pumping Station accompanies this report. We believe it will be the most economical and up-to-date station in every respect in the country when completed, equipped with every known modern appliance which makes for utility and economy, to insure the proper distribution of the city's water. This work will take approximately five years to finish, and when completed will provide for the city's water supply for a population of one million persons.

We have to report no very serious number of breaks in our water mains this year. In this respect we have been very fortunate, we suffering but one serious break, which has been accounted for elsewhere in detail in this report. Neither has there been any serious number of lives lost in our work this year, one man meeting an untimely death, and several have been more or less injured of the employees of this department.

We have done what was consistent with a humane employer's treatment of a disabled servant in reference thereto, servants disabled while working in his employ and in the line of their duty, in endeavoring to mitigate the ills of the injured and to assuage the sorrow of the surviving wife and children of the killed, pursuing our policy of taking care of the men who are injured in our employ, whether there is any strict legal liability or not, upon our parts so to do, and to the utmost of the calls of humanity.

We also report the installation by this Board of about fifty sanitary drinking fountains distributed about the city for the use of its citizens and the strangers and visitors within its gates. That we have located them in the places we deemed that they would be in most demand, and as desired on some occasions by your Honorable Body, the Board of Poor Commissioners and other municipal departments. That immediately upon their being put into commission they were a success. That mature men and women, young men and maids, children and even babies in their go-carts patronized them. They have been a source of congratulation to this Board and their spontaneous success affords us great pleasure.

Finally the finances and revenues of this Board are in a satisfactory condition, but to carry on these great works proposed, we must have authority to increase our bonding limit and be authorized to provide for a new issue of bonds, your help in obtaining which we hereby solicit, and in the near future we will ask you to take some action in co-operation with us to attain that end. While our revenues are large, being about three quarters of a million of dollars per year, yet our expenditures are also necessarily large in the placing of pipe in the ground and putting it in use, and conducting this large system.

It is our duty as we see it to get the best kind of pipe in the market. Pipe that will stand the most extreme tests, before being buried and placed in position, and then imbed the pipe purchased in the ground, in the places where it will best suit our citizenship, and supply its wants. Also to exercise a trustworthy stewardship over the disbursements of these trust funds, our revenues, all of which we believe we have faithfully done.

Hoping that the future history of this Board may be as bright and trustworthy as the past, and assuring your Honorable Body that we will see to it, that it shall not deteriorate under our management, we herewith respectfully submit the foregoing and accompanying, as our report, with a reference to the subjoined reports to us by our officers, for further details of the work of this department.

Respectfully submitted,
EDWARD W. PENDLETON,
JOHN F. DODGE,
FRED J. CLIPPERT,
JAMES H. POUND,
BASIL LEMKE.

Board of Water Commisioners of the City of Detroit.

REPORT OF THE SECRETARY.

DETROIT, MICH., JULY 1ST, 1908.

To the Honorable, The Board of Water Commissioners of the City of Detroit:

GENTLEMEN:—I have the honor to submit herewith my report as Secretary, of the receipts and disbursements of this department for the year ending June 30, 1908.

Respectfully submitted,

BENJ. F. GUINEY,
Secretary.

Receipts.

Water rates assessed	$378,175 26	
Water rates metered	222,331 30	$600,506 56
Percentage		7,313 16
Shutting off and letting on		295 50
Service cocks, permits	11,481 75	
Service cocks, labor and material	353 93	11,835 68
Service extensions		108 89
Plumbers' license		520 25
City of Detroit, general tax levy		75,000 00
Real estate revenue and expense, rentals		1,350 00
Meter, material and labor		906 93
Meter repairs and expense, material and labor.		14 00
Pumping water, material		20 40
Pumping works, material		50 00
Repairing leaks, material and labor		2 33
Engineering, material		10 35
Horse expense		1 22
Office		56 00
Iron pipe, material and labor	12,217 25	
Bonus	3,056 68	

Village of Highland Park, estimate for laying pipe	18,045 36	
Village of Ecorse, estimate for laying pipe	2,991 00	
Village of Saint Clair Heights, estimate for laying pipe	2,981 00	
Village of Hamtramck, estimate for laying pipe	1,446 00	
Village of Fairview, estimate for laying pipe	1,254 00	
H. O. Walker, estimate for laying pipe	140 00	42,131 29
Interest on General Fund	1,826 89	
Interest on Sinking Fund	1,757 15	
Interest on Hurlbut Fund	17 75	3,601 79
Hurlbut Fund from Trustees		4,482 80
Total receipts for the year		$748,207 15

Disbursements.

OPERATION AND MAINTENANCE.

Office Account—		
General manager, secretary and clerks	$ 28,981 31	
Watchman and janitor	2,127 00	
General work and carpenter	1,591 59	
Books, printing and stationery	905 14	
Telephone rental	276 23	
Advertising and subscription	95 66	
Stamped envelopes and postage	361 56	
Towel supply	67 25	
Street car tickets	12 50	
Disinfectant	3 00	
Ice	36 18	
Coal	339 21	
Gas and electric power	11 68	
Bond premiums	110 00	
Horse care	150 00	
Horse shoeing	13 75	
Still Alarm	93 75	
Miscellaneous	158 73	
		$35,334 54
Service Connections and Leaks Account—		
Superintendent inspection and labor	$ 15,918 71	
Service cocks, sleeves and valves	6,898 91	

Tools and repairs	497 95	
Printing	44 10	
Telephone rental	40 00	
Car tickets	267 50	
Re-paving	201 89	
Freight and express charges	4 26	
Pipe and fittings	104 29	
Packing and waste	4 90	
Rubber boots	8 60	
Miscellaneous	1 58	
		$23,992 69
Pumping Water Account—		
Engineers, firemen, coal passers	$ 40,473 37	
Coal	38,658 39	
Unloading coal	3,998 93	
Boiler, engine supplies and repairs	2,010 61	
Engine oil and grease	747 12	
Waste packing and rags	429 88	
Boiler inspection	30 00	
Electric fixtures and repairs	10 77	
Hose and couplings	38 80	
Tools and fittings	150 90	
Paint, oil and glass	57 95	
Printing and stationery	9 90	
Telephone rental	40 00	
Ice	30 10	
Towel supply	44 30	
Horse shoeing and harness	31 55	
Horse feed and bedding	118 19	
Express charges	12 10	
Advertising	26 78	
Lumber	2 88	
Miscellaneous	142 20	
		$87,064 72
Repairing Leaks Account—		
Superintendent, clerks and labor	$ 1,632 77	
Inspection and re-paving	318 67	
Telephone rental	20 00	
Repairing pipe, village of River Rouge	884 00	
Miscellaneous	25 25	
		$ 2,880 69

Meter Repairs and Expenses—		
Superintendent and labor	$ 1,731 13	
Meter fittings	1,631 90	
Express and freight charges	1 15	
		$ 3,364 18
Percentage—		
Superintendent and inspection	$ 6,828 33	
		$ 6,828 33
Inspection—		
Superintendent and inspectors	$ 7,870 30	
Car tickets	147 50	
Electric lamps	19 75	
Printing	41 40	
		$ 8,078 95
Wagon and Harness—		
Harness and repairs	$ 285 08	
Wagon repairs	283 62	
Trucks	350 00	
Barn tools	18 72	
		$ 937 42
Office Furniture and Fixtures—		
Furniture and repairs	$ 152 99	
Electric Fixtures and repairs	47 89	
Lockers	186 55	
Fittings, hardware, etc	4 50	
		$ 391 93
Real Estate Revenue and Expense Account—		
Insurance premiums	$ 68 49	
Electric wiring storage yard	100 00	
Pipe and fittings	79 76	
Paint and glass	126 99	
Lumber, brick, sand and stone	1,898 93	
Roof repairs	214 00	
Alterations storage yard office	108 40	
Payment emergency station	8,554 90	
Air chamber emergency station	1,578 00	
Wiring emergency station	1,558 37	
Steel and iron work, emergency station	394 25	
Heating apparatus	1,110 25	
Smith, Hinchman & Grylls, architects	895 33	
Painting, etc., Supt. residence	165 00	

Office alterations	9,203 50	
Drinking fountains	68 06	
Labor	2,014 08	
Miscellaneous	203 13	
		$28,341 44
Plumbers' License—		
Printing	$ 4 75	
		$ 4 75
Horse Expense, Repairing Leaks—		
Oats, hay and bedding	$ 1,179 64	
Shoeing	193 42	
Horse board	210 00	
Barn tools	2 50	
Doctor's services and drugs	17 53	
		$ 1,603 09
Horse Expense, Service Connections—		
Oats, hay and bedding	$ 1,440 36	
Shoeing	228 34	
Barn tools	1 50	
Doctor's services and drugs	22 83	
		$ 1,693 03
Interest—		
Coupons	$ 34,296 67	
		$34,296 67
Real Estate—		
Interest J. E. Edward's Estate, land contract	$ 1,750 00	
Purchase of lot	1,100 00	
		$ 2,850 00
Pumping Works Grounds—		
Superintendent and laborers	$ 7,246 62	
Furniture	3 38	
Tools, fittings, etc	269 96	
Cement, sand and stone	691 68	
Subscription	17 68	
Paint, oil and glass	68 64	
Ice	22 19	
Seed, plants and flower pots	64 12	
Hose and couplings		
Telephone rental	15 50	
Car tickets	4 25	

Horse shoeing	6 60	
Towel supply	8 55	
Miscellaneous	32 00	
		$ 8,451 17
Iron Pipe, Construction—		
Superintendent and clerks	$ 8,606 92	
Foremen	5,461 58	
Watchman, teamsters, brick layers	23,169 95	
Laborers	150,632 95	
Iron pipe	180,775 12	
Special castings	9,433 25	
Gates, valves and hydrants	11,817 76	
Pig lead	6,379 74	
Lead pipe and solder	994 71	
Brick, cement, sand and stone	8,018 00	
Lumber	3,406 28	
Coal	893 80	
Tools	1,293 57	
Repairing tools	145 02	
Lantern globes, nails and fittings	1,855 58	
Iron beams and T rails, braces	2,267 28	
Cartage	542 10	
Car tickets	211 25	
Telephone rental	199 66	
Books, printing and stationery	456 87	
Hose and couplings	864 82	
Inspection and re-paving	6,598 22	
Rubber boots and repairs	144 06	
Protecting R. R. tracks for laying water pipe	1,505 34	
Rope packing and rags	321 56	
Oil and gasoline	329 80	
Paint and glass	74 82	
Doctor's services and damages and funeral expense	319 60	
Advertising	108 90	
Still Alarm	41 25	
Freight charges	229 82	
Refund, Village of Hamtramck	104 99	
Refund, Village of St. Clair Heights	181 15	
Refund, Village of Ecorse	453 41	
Right of way	350 00	

Wood plugs	53 75	
Elec. trucks, auto's repairs and expense	5,443 51	
Locomotive crane	4,600 00	
Refund bonus, A. M. Lowe	50 45	
Expenses, C. W. Hubbell, C. E.	74 00	
Towel Supply	24 25	
Ice	51 73	
Pump repairs	44 80	
Air compressor	181 97	
Miscellaneous	602 60	
		$439,316 19
Horse Expense, Iron Pipe—		
Oats, hay and bedding	$ 2,098 37	
Horse shoeing	338 34	
Veterinary services and drugs	27 33	
Barn tools and rental	85 25	
		$ 2,549 29
Meter—		
Superintendent, foremen and laborers	$ 5,548 07	
Meters	9,191 34	
Special castings and fittings	110 50	
Telephone rental	67 40	
Printing and stationery	7 57	
Lumber	27 78	
Packing and rags	7 36	
Gasoline	2 75	
Horse shoeing	9 50	
Bicycle repairs	12 05	
Tools and repairs	265 13	
Paint, oil and glass	2 25	
Harness repairs	11 25	
Express and freight charges	73 60	
Miscellaneous	4 49	
		$15,341 04
Engineering—		
Civil engineer and assistants	$ 17,513 03	
Tracing cloth and paper	130 08	
Printing, stationery and maps	474 72	
Street car tickets	220 00	
Telephone rental	59 51	
Instruments, tools and fittings	403 06	

Postage	20 00	
Camera and supplies	129 16	
Paint and oil	15 26	
Typewriter	91 13	
Lumber	32 23	
Express and freight charges	7 94	
Subscription and books	31 79	
Electric power and fixtures	84 16	
Towel supply	4 00	
Miscellaneous	277 87	
		$19,493 94
Pumping Works, Construction—		
Superintendent, foreman and laborers	$ 1,318 92	
Dock repairs and repairing roof	90 29	
A. Rohns, contract stair case at crib	549 00	
Hose and rope	28 92	
Painting stand tower	164 00	
Repairs to engine	1,229 00	
Tools and fittings	8 25	
Covering boiler	22 00	
Electric fixtures and installing electric light	621 85	
Paint, oil and glass	3 90	
Lumber	266 38	
Miscellaneous	172 61	
		$ 4,475 12
Village of Fairview—		
Superintendent, foreman and laborers	$ 61 51	
Repairing hydrants	145 64	
		$ 207 15
Hurlbut Fund—		
Library assistants, Supt. and laborers	$ 4,375 71	
		$ 4,375 71
Bonded Indebtedness—		
Bonds redeemed	$ 10,000 00	
		$10,000 00

RECAPITULATION OF EXPENDITURES, FOR OPERATION, MAINTENANCE, CONSTRUCTION AND IDEPENDENT.

For Operation and Maintenance—	
Office	$ 35,334 54
Service connections and leaks	23,992 69
Pumping water	87,064 72

Repairing leaks	2,880 69	
Meter repairs and expense	3,364 18	
Percentage	6,828 33	
Inspection	8,078 95	
Wagon and harness	937 42	
Office furniture and fixtures	391 93	
Real estate, revenue and expense	28,341 44	
Horse expense, service connections	1,693 03	
Horse expense, repairing leaks	1,603 09	
Plumbers' license	4 75	
Pumping works grounds	8,451 17	
		$208,966 93
For Construction—		
Iron pipe	$439,316 19	
Iron pipe, horse expense	2,549 29	
Meter	15,341 04	
Engineering	19,493 94	
Pumping works	4,475 12	
Fairview Village	207 15	
		$481,382 73
For Miscellaneous—		
Hurlbut Fund	$ 4,375 71	
Bonded indebtedness	10,000 00	
Interest	34,296 67	
Real estate	2,850 00	
		$ 51,522 38
Total		$741,872 04

GENERAL RECAPITULATION OF EXPENDITURES.

Total Operation	$208,966 93	
Total Construction	481,382 73	
Total Miscellaneous	51,522 38	
		$741,872 04

RECAPITULATION OF EXPENDITURES, JULY 1st, 1907, TO JUNE 30th, 1908.

1907.	
July	$ 95,053 23
August	64,504 38
September	79,265 74
October	82,225 55

November	56,055 53	
December	46,835 75	
1908.		
January	49,771 47	
February	53,394 39	
March	76,137 07	
April	35,208 29	
May	69,621 87	
June	33,798 77	
		$741,872 04

TOTAL RECEIPTS FROM JULY 1st, 1907 TO JULY 1st, 1908.

1907.		
July	$178,168 68	
August	76,493 68	
September	23,716 93	
October	120,798 46	
November	18,082 41	
December	22,904 11	
1908.		
January	133,443 31	
February	13,631 64	
March	18,589 78	
April	107,835 88	
May	14,747 14	
June	19,795 13	
Total Receipts	$748,207 15	
Cash on hand June 30, 1907	2,704 75	
		$750,911 90

With bank deposits as follows:

1907	
July	$171,733 99
August	84,449 99
September	19,504 10
October	118,581 44
November	23,390 64
December	20,205 53
1908.	
January	131,553 32

February	**19,007 21**	
March	**15,261 17**	
April	**104,960 94**	
May	**20,769 11**	
June	**17,479 32**	
Total deposits	**$746,896 76**	
Cash on hand June 30, 1908	**4,015 14**	
		$750,911 90

CASH STATEMENT FOR YEAR ENDING JUNE 30th, 1908.

		Dr.	
Cash on hand June 30th, 1907		$ 2,704 75	
Cash in bank—			
General Fund	$31,688 73		
Sinking Fund	31,122 41		
Hurlbut Fund	28 98		
Secretary Fund	1,000 00		
		$ 63,840 12	
Total receipts		748,207 15	
			$814,752 02
		Cr.	
Cash on hand June 30th, 1908		$ 4,015 14	
Cash in bank—			
General Fund	$ 4,128 13		
Sinking Fund	63,582 89		
Hurlbut Fund	153 82		
Secretary Fund	1,000 00		
		$ 68,864 84	
Total Disbursements		$741,872 04	
			$814,752 02

THE AMERICAN NATIONAL EXCHANGE BANK.

DETROIT, MICH., JULY 1ST, 1908.

Benj. F. Guiney, Secretary, Board of Water Commissioners of the City of Detroit:

DEAR SIR:—This to certify that the amounts of balances in this bank to the credit of the Board of Water Commissioners of the City of Detroit, at the close of business June 30, 1908, were as follows: General Fund, $4128.13; Sinking Fund, $63,582.89; Hurlbut Fund, $153.82; Secretary Fund, $1,000.00.

Yours truly,

CHAS. S. HOWARD,
Auditor.

Assessments, 1908-1909.

Dist.	Wards	Families				Increase	Vacant Tenements	Assessments		
		Supplied by Meter	Assessed	Not Supplied	Whole Number			1908-1909	Increase	Trans-F'r'd to Meter Rolls
A1	Seventeenth	374	6124	34	6532	933	55	$33,125 00	$5,399 39	$358 72
B1	Ninth	698	6548	3	7249	267	63	22,338 86	584 42	235 36
	Fift'nth	432	3282	1	3715	359	29	17,463 00	1,569 48	301 36
	Total	1504	15954	38	17496	1559	147	72,926 86	7,553 29	895 44
2	Elev'nth	335	4676	....	5011	11	60	18,588 58	49 98	203 04
	Thirteenth	453	4726	....	5179	257	112	20,645 98	843 88	369 32
	Total	788	9402	...	10190	268	172	39,234 56	893 86	572 36
3	First	1474	3526	....	5000	149	72	24,920 34	1,024 79	144 56
	Seventh	464	3709	4	4177	134	101	13,239 02	69 86	91 42
	Total	1938	7235	4	9177	283	173	38,159 36	1,094 65	235 98
4	Third	820	4175	3	4998	225	67	19,862 22	837 46	83 56
	Fifth	655	4965	3	5623	228	85	19,893 68	691 38	107 00
	Total	1475	9140	6	10621	453	152	39,755 90	1,528 84	190 56
5	Second	1393	2104	1	3498	109	35	18,646 34	406 38	170 68
	Sixth	840	4080	....	4920	51	54	19,994 38	240 34	172 56
	Total	2233	6184	1	8418	160	89	38,640 72	646 72	343 24
6	Tenth	544	5265	....	5809	268	82	24,559 22	963 76	78 94
	Fourteenth	287	4162	14	4463	284	105	18,942 58	1,182 92	100 12
	Total	831	9427	14	10272	552	187	43,501 80	2,146 68	179 06
7	Fourth	951	3850	4	4805	270	59	22,920 32	1,287 74	201 84
	Twelfth	324	4710	....	5034	255	86	21,284 78	1,440 20	153 36
	Total	1275	8560	4	9839	525	145	44,205 10	2,727 94	355 20
8	Eighth	596	4518	2	5116	193	42	22,804 72	1,107 78	197 88
	Sixt'nth	379	6628	12	7019	353	109	26,948 64	1,449 60	261 64
	Total	975	11146	14	12135	546	151	49,753 36	2,557 38	459 52
9	Eighteenth	141	4070	338	4549	383	152	16,641 60	1.554 06	355 13
	Grand Total	11160	81118	419	92697	4729	1368	382,819 26	20,703 42	3,586 49

Receipts of Water Rates by Districts.

From July 1, 1907 to July 1, 1908.

YEARS	First District Wards 9, 15 and 17	Second District Wards 11 and 13	Third District Wards 1 and 7	Fourth District Wards 3 and 5	Fifth District Wards 2 and 6	Sixth District Wards 10 and 14	Seventh District Wards 4 and 12	Eight District Wards 8 and 16	Ninth District Ward 18	METERS	Total
1898-09	....	....	50	... .	....	......	....	....	....	....	50
1893-04	....	....	5 00	....	....	....	....	....	....	....	5 00
1895-06	....	....	....	....	5 00	....	....	....	....	....	5 00
1902-03	... .	.. ..	....	....	....	2 00	....	....	....	....	2 00
1905-06	....	....	1 30	3 44	2 84 1 05	1 15 3 23 65	....	....	10	....	13 78
1906-07	1,317 72	476 34	950 68	1,035 97	1,133 19	791 63	1,040 28	1,162 08	622 07	....	8,529 96
1907-08	68,925 74	39,211 45	37,319 99	38,220 99	37,775 49	42,121 96	42,549 37	47,672 59	15,821 59	222,331 30	591,950 47
Total	70,243 46	39,687 79	38,277 47	39.260 40	38,917 57	42,920 59	43.589 65	48,834 67	16,443 76	222,331 30	600,506 66

Estimated Valuation of Works.

Real estate	$ 476,803 60
Buildings, docks, basins, tunnel and crib, engines, etc., at pumping station	2,696,889 89
Water pipe in use	5,404,081 64
Office furniture and fixtures	13,920 08
Meters in use	123,611 79
Tools and materials on hand—	
In office of Civil Engineer	27,297 77
In office of Superintendent of Construction	654 75
In Inspection Department	136 00
In Meter Department	2,655 81
In Pumping Works Department	16,860 94
In Hurlbut Fund Department	2,750 00
In Service Connection Department	6,191 46
At Storage Yards	105,223 59
Total	$8,877,077 32

The Amount Expended for the Pumping Works to July 1, 1908.

	Previously Expended.	July, 1908.	Total
Land	$ 70,613 29	$2,850 00	$ 73,463 29
Force Mains	624,058 03	....	624,058 03
Inlet Pipe	104,257 36	....	104,257 36
Docks, Basins and Canal	165,003 23	1,363 27	166,366 50
Conduits and Wells	310,446 77	....	310,446 77
Engine, Boiler, Coal Houses and Chimney	349,461 90	....	349,461 90
Stand Pipe and Tower	31,824 25	209 94	32,034 19
Pump Wells	54,221 56	....	54,221 56
Engines	650,713 59	....	650,713 59
Boilers	121,556 55	1,251 00	122,807 55
Engineer's House	8,423 88	....	8,423 88
Sewers	6,666 25	....	6,666 25
Electric Light Plant	3,178 37	621 85	3,800 22
Inspection	7,512 54	....	7,512 54
New Gallery	8,249 10	....	8,249 10
Traveling Crane and Coal Cars	2,590 00	....	2,590 00
Ground, Fence and Gateway	202,316 52	8,086 99	210,403 51
Library, Greenhouse and Belvedere	36,558 09	4,642 09	41,230 18
Tunnel and Crib	200,620 94	549 00	201,169 94
Miscellaneous	23,705 98	844 24	24,550 22
Total	$ 2,982,008 20	$ 20,418 38	$3,002,426 58

Water Works Bonds.

The following table shows the whole history of the bonded indebtedness of the Board, in which it will be seen that the total amount of bonds issued is $2,800,000 of which $1,860,000 have been redeemed or refunded, leaving outstanding $940,000.

The $100,000.00 seven per cent. bonds which matured September, 1899, and $100,000.00 seven per cent. bonds which matured February 1st, 1900, were on the latter date refunded at three and one-half per cent. $100,000.00 of the $250,000.00 seven per cent. bonds which matured August 1st, 1904, were refunded at 4 per cent.

No. of Issue.	Act of	Issued	Payable	Amount	Rate of Intr'st	Redeemed or Refunded	Out-standing
1st.	1858	Aug. 1, 1853	Aug. 1, 1883	$100,000	7cts.	$100,000	....
"	"	" "	Aug. 1, 1878	100,000	7 "	100,000	....
"	"	" "	Aug. 1, 1873	50,000	7 "	50,000	....
2nd	1855	Aug. 1, 1855	Aug. 1, 1890	100,000	7 "	100,000	....
"	"	June12, 1855	Aug. 1, 1885	100,000	7 "	100,000	....
"	"	" "	Aug. 1, 1880	50,000	7 "	50,000	....
3rd	1857	Aug. 1, 1858	Aug. 1, 1893	150,000	7 "	150,000	....
"	"	Aug. 1, 1867	Aug. 1, 1887	100,000	7 "	100,000	....
* 4th	1869	Feb. 1, 1870	Feb. 1, 1900	100,000	7 "	100,000	....
5th	"	Aug. 1, 1872	Aug. 1, 1902	50,000	7 "	50,000	....
6th	"	Aug. 1, 1873	Aug. 1, 1903	50,000	7 "	50,000	....
"	1873	Feb 1, 1874	Feb. 1, 1904	50,000	7 "	50,000	....
7th	1869	Aug. 1, 1874	Aug. 1, 1904	50,000	7 "	50,000	....
"	1873	" "	" "	200,000	7 "	200,000	....
"	"	June 1, 1875	June 1. 1905	150,000	7 "	150,000	....
"	"	June 1, 1876	June 1, 1906	200,000	6 "	200,000	....
* "	"	Sept. 1, 1880	Sept. 1, 1899	100,000	4 "	100,000	....
"	"	April 1, 1881	April 1, 1897	100,000	4 "	100,000	....
"	"	Dec. 1, 1881	Dec. 1, 1896	50,000	4 "	50,000	....
"	"	Jan.10, 1895	Jan.10, 1925	100,000	4 "	....	100,000
*refund	1869	Feb. 1, 1900	Feb. 1, 1930	200,000	3½"	10,000	190,000
	1873	Jan. 1, 1903	Jan. 1, 1933	50,000	3½"	....	50,000
	1873	Sept.1, 1903	Sept. 1, 1933	150,000	3½"	....	150.000
	1901	June. 1, 1904	June.1, 1934	200,000	3½"	....	200,000
	"	Aug. 1, 1904	Aug. 1, 1919	100,000	4 "	....	100,000
Refund	1873 1901	Feb. 1, 1905	Feb. 1. 1935	150,000	3½"	....	150,000
				$2,800,000		$1,860,000	$940,000

Respectfully submitted,

BENJ. F. GUINEY,

Secretary.

REPORT OF THE GENERAL MANAGER.

DETROIT, MICH., JULY 1ST, 1908.

To the Board of Water Commissioners of the City of Detroit:

GENTLEMEN:—I respectfully submit a report of the general operations of the works for the year ending June 30th, 1908.

The assessment rolls of water rates show a gain over the previous year of $20,703.42. During the year, places on the assessment rolls, with a total assessment of $3,586.49 were transferred to the meter rolls.

The increase of families on assessment rolls for the same period was 4,729. The details of the number of families assessed in each ward and district, vacant tenements, number of families not assessed and increase of assessment by wards will be found by reference to the table of assessments in the report of the Secretary.

The total number of gallons pumped during the year was 26,857,139,195, of which 99,457,896 gallons were supplied to the Village of Hamtramck; 118,008,968 to the Village of River Rouge; 64,260,680 gallons to the Village of Highland Park; and 6,195,684 to the Village of Ecorse.

The excess of pumpage over the previous year was 1,738,844,154. The average daily consumption (including villages), was 73,380,162 gallons, an average daily increase of 4,562,915 gallons.

The highest day's pumpage was 91,057,950 gallons, on June 22, 1908, and the lowest was 59,286,935 gallons on April 19, 1908.

The amount received for metered water was $222,331.30, of which amount the Village of Highland Park paid $2,900.36; the Village of River Rouge $5,519.01; the Village of Ecorse $287.40, and the Village of Hamtramck $4,529.22.

Storage Yards.

Many needed improvements have been made at the Storage Yards during the year. The houses of the Superintendent and the cottages occupied by the Emergency crew on Erskine Street have been repainted and necessary repairs made to place plumbing and drainage in proper sanitary condition. A brick building 30 x 108 feet was erected in the west yard, in which is a stock room and accommodations for cement, coal, and similar supplies. The railroad sidings were re-arranged to facilitate unloading of materials direct from cars to shed. A similar shed, 32x82 was built in the east yard and is used for storing derricks, engines, pumps and other large materials and as a place for cleaning specials, etc. New brick shelter wagon sheds have been ordered erected to replace the old wooden structures now used for such purposes, and will be built during the coming year.

The above changes necessitated an increase in the capacity of the transformer, necessary changes in mains, and the re-arrangement of the entire system of distribution of the lighting service. This work was done under supervision of the Public Lighting Commission and there is now a capacity for any additional lamps which may be required in the future without another change.

The Board contracted in the spring for the furnishing of a ten ton Locomotive Crane complete. This has been in commission for some months with the most satisfactory and economical results.

Orleans street, including the section dividing the two yards, was paved by the City.

Sanitary Drinking Fountains.

The Board ordered a number of sanitary drinking fountains placed, during the past summer, at various points in the City where travel was most dense, and they met with immediate popular favor.

Location of Drinking Fountains July 1, 1908.

Russell and High.
Randolph and Monroe.
Gratiot and Farmer.
Woodward and State.
Griswold and Lafayette.
Michigan and Porter.
Sixth and Abbott.
Michigan and Trumbull.
Trumbull and Cherry.
Trumbull and Locust.
Grand River and High.
Michigan and Vermont.
Michigan and Fourteenth.
Vermont and Baker.
Eighteenth and Michigan.
Vinewood and Michigan.
Dragoon and Dix.
Boulevard and Dix.
Clark and Fort.
Twenty-First and Fort.
Grand River and Trumbull.
Grand River and Twelfth.
Grand River and Fourteenth.
Woodward and Harper.
McDougal and Ferry, (Play grounds.)

Pumping Station.

A large amount of work has been done during the season in the proper care of the grounds. Most of the roads have been raised and re-graveled, and attention has been given to the improvement of the river front. The west bank of the canal and the bank leading to dock have been cobbled. The bank extending west from canal is now being protected in like manner.

Upon completion of the Emergency House on Fisher Avenue, the emergency men who had been maintained at the station, as a precautionary measure in case of breaks in large mains in that locality, were removed to said new building and the building at the station utilized as a tool house. Additional storage room for protection of the fire apparatus, mowing machines, sprinkling wagons, etc., is imperatively needed.

The interior of the pumping house and all outside woodwork of pumping station building were repainted.

The room in center of boiler building was altered to provide accommodations for locker and wash rooms for the firemen, the change being necessitated by the construction of a new coal shed, now being built between the old coal sheds.

The following Table shows the amount of water pumped each year from 1852 to 1908.

YEARS	FAMILIES SUPPLIED.	WATER PUMPED.	
		TOTAL QUANTITY.	PER FAMILY,
1852	....	235,840,275	......
1853	4,283	303,531,743	70,868
1854	4,619	376,265,126	81,460
1855	5,282	542,807,364	102,765
1856	5,706	692,124,305	121,297
1857	6,189	697,190,523	112,650
1858	6.474	718,091,207	110,919
1859	6,794	782,112,587	115,118
1860	6,750	870,036,451	125.185
1861	7,128	895,129,423	125,579
1862	7,275	994,945,329	186,762
1863	7,699	1,035,798,043	134,534
1864	7,993	1,019,390,256	127,410
1865	8,351	1,040,514,887	125,675
1866	9,089	1,196,317,922	131,622
1867	10,242	1,425,535,230	139,186
1868	11.544	1,666,545,125	144.364
1869	12,774	1,946,810,325	152,400
1870	13,722	1,866.060,068	186,000
1871	14,896	2,300,150.605	154,414
1872	16,035	2,782,292.578	173,513
1873	17,019	3.198,393,948	187,930
1874	18.853	3,289,872,635	174,511
1875	19,606	4,207,454,260	214,600
1876	20,102	4,065,134,470	200,225
1877	20,345	4,213,239.790	207,090
1878	20,603	4,345,743 333	210,927
1879	21,341	5,129.599,110	240.348
1880	22,465	5.552,965,310	247,183
1881	23,749	6,543,127,968	279,722
1882	25,442	6.284,000,742	243,062
1883	27,415	7,379,327,788	269.170
1884	29,424	8,510,614,140	289,260
1885	30,533	9,970,829,580	326,886
1886	31,946	10,576,571,254	331,070
1887	34,486	13 168,859,808	381,860
1888	36,863	14,380,166.670	390,098
1889	39,158	12,875,384 453	328,880
1890	41,467	12,120.944,532	292,300
1891	43,933	12.057,261.236	274,470
1892	46,400	12,276.612.482	264,582
1893	49,817	13,877,977,208	278,579
1894	49,912	13,649,779,605	273,476
1895	51,426	14,698,451,954	285,818
1896	53,941	13,254,369,371	245.719
1897	54,945	12,928,821,326	235,305
1898	56,341	14,278,682,058	253,433
1899	58.931	16,348,062,701	277,410
1900	60,524	17,077,100,477	282,154
July, 1901 to July, 1902	64,718	18,333,104,706	283,320
July, 1902 to July, 1903	67,280	18,757,682,360	275,440
July, 1903 to July, 1904	70.087	21,734,954,234	805,131
July, 1904 to July, 1905	73,293	21,977,576,875	294,247
July, 1905 to July, 1906	80,848	22,895,312,104	271,607
July, 1906 to July, 1907	87,371	25,118,295,041	284,023
July, 1907 to July, 1908	92,278	26.857,139.195	* 287,925

* 287,923,228 gallons delivered outside City; deducted from total consumption.

Pipeage System.

You are respectfully referred to the report of the Civil Engineer for details of the work in this department during the year.

A large amount of pipe for increased fire protection was laid during the year, the most important extensions being the following:

Thirtieth St. between Rich and Herbert, 510 ft. of 6in. pipe; 25th street and Shady Lane, 1060 ft. of 8 inch and 321 ft. of 6 inch; 21st street, between Howard and Bristol, 1029 ft. of 12 inch; Rademacher, between Fort and Lafayette and Lafayette between Rademacher and Waterman, 1234 ft. of 8 inch; Spruce, between Brooklyn and alley east of Trumbull, 610 ft. of 8 inch; north of Fort street, on 2nd, 3rd, and 5th, 2550 ft. of 8 inch; Springwells, between Granite and Chamberlain, 590 ft. of 12 inch; Regular, between Military and Dragoon, 340 ft. of 8 inch; Scotten, between Porter and Dix, 1504 ft. 12 inch; Adelaide, between Beaubien and St. Antoine, 508 ft. of 10 inch; and from Rivard to west of Bishop School, 416 ft. of 10 inch; Beaubien, Madison to Elizabeth, 865 ft. of 10 inch; Clippert, south of Michigan, 1630 ft. of 8 inch; Lauderdale, west of Junction 600 ft. of 8 inch; Summit, Jefferson to Wabash R. R., 1090 ft. of 10 inch; Forest, between Hastings and St. Antoine, 621 ft. 10 inch and from Dubois to west of Dequindre, 810 ft. of 10 inch; Herbert, between 28th and 31st, 799 ft. of 8 inch; Lewerenz, south of Regular, 428 ft. of 6 inch; Marantette, between Vermont and 14th, 741 ft. of 12 inch; Putnam, between 4th and Alley west of 2nd, 734 ft. of 8 inch. A 42 inch main on Jefferson West, from Artillery to Solvay is under construction.

All gates were examined, repairs made where necessary, and dead ends regularly blown off.

The total mileage of the distribution system July 1st, 1908, was 727 miles and 4,102 feet, of which 666 miles and 703 feet are within the city and 61 miles and 3,399 feet in the adjoining villages. Twenty-one miles and 3,515 feet were laid during the year and 18,445 feet discontinued or replaced by larger sizes, making a net increase of 18 miles and 910 feet, of which 2,129 feet were laid in the Village of St. Clair Heights; 3,345 feet in the Village of Ecorse; 1,451 feet in the Village of Hamtramck; 15,535 feet in the Village of Highland Park.

The following is the report of the Board of Health of examination of the water supply for the month of June, 1908:

Examination of Detroit's Water Supply.

Taken from Laboratory Tap. Appearance—Nearly Clear.	Parts Per Million.
Temperature	20.3C
Total solids	114.000
Volatile matter	37.000
Non volatile matter	77.000
Free ammonia	.020
Albuminoid ammonia	.038
Nitrogen as nitrates	.180
Nitrogen as nitrites	None
Chlorine	4.610
Oxygen absorbed in 15 minutes	.40
Oxygen absorbed in 4 hours	.88
Bacteria per cubic centimeter	102
Bacteria per cubic centimeter	98
Bacteria per cubic centimeter	125
Bacteria per cubic centimeter	168

Animal inoculations, 2—both recovered.

Conclusion: Water is in satisfactory condition.

All of which is respectfully submitted.

H. S. STARKEY,
General Manager.

REPORT OF THE CIVIL ENGINEER.

DETROIT, MICH., JULY 1ST, 1908.

To the Board of Water Commissioners of the City of Detroit:

GENTLEMEN:—Your Civil Engineer hereby respectfully submits a report of the work done by and under his direction for the year ending June 30th, 1908. This embraces all operations carried on by your Civil Engineering Department, Construction Department, Emergency Station, and at the Intake Crib.

Population.

The City of Detroit contains an area of about forty (40) square miles. There have been two additions to the city during the past year, one bounded by Twelfth Street, Grand River Avenue, Lothrop Avenue and Euclid Avenue, and situated in the eighth, tenth and twelfth wards; the other addition bounded by Goodwin Avenue, Grand Trunk R. R., extending south from Highland Park to the line between Westminster and Holbrook Avenues, and located in the fifth and seventh wards. The total number of families as determined by the June census of the Board is 92,679, and assuming 4.602 persons per family, as indicated in the annual report for 1904, the estimated population within the limits of the city is 426,592. The count within the city limits includes 419 families which are not supplied with water. Outside of the city limits there are 368 families not included in the enumeration of Villages. The estimated number of persons in Detroit supplied with water is 424,581, and as there are 80,706 taps in the city, the number of persons per tap is 5.26. Allowing 5.26 persons per tap for the Villiages the estimated population supplied is as follows:—

Place	No.		Est. Population Supplied.
Detroit	92,697	families	424,581
Outside Detroit & villages	368	"	1,694
Highland Park	562	taps	2,956
River Rouge	783	"	4,119
Ecorse	275	"	1,447
Hamtramck	640	"	3,366
Total population supplied			438,157

The estimated increase in population of the City of Detroit for the past four years is as follows:

Year	Est. Population	Estimated Increase Over Previous Year
1903-4	317,591	
1904-5	339,827	22,236
1905-6	377,208	37,381
1906-7	404,782	27,574
1907-8	426,592	21,810

Consumption.

The daily per capita consumption of water for the past year is given in the following table:

CORPORATION	U. S. GALLONS SUPPLIED July 1st, 1907 to June 30th, 1908 inclusive.		EST. NO. PERSONS SUPPLIED	GALLONS PER CAPITA DAILY
	TOTAL	DAILY AVERAGE		
Detroit, unmetered........	18,159,171,467	49,615,223	426,592	167.8
Detroit, metered..........	8,386,105,508	22,912,857		
Highland Park, metered.	64,260,680	175,576	2,956	59.5
River Rouge, metered....	118,008,968	322,430	4,119	78 4
Ecorse, metered...........	6,195,684	16,928	1,447	11.7
Hamtramck, metered	99,457,896	271,743	3,366	80.9
Palmer Park, metered....	23,938,992	65,407	....	....

The daily per capita consumption of water for the past six years is as follows:

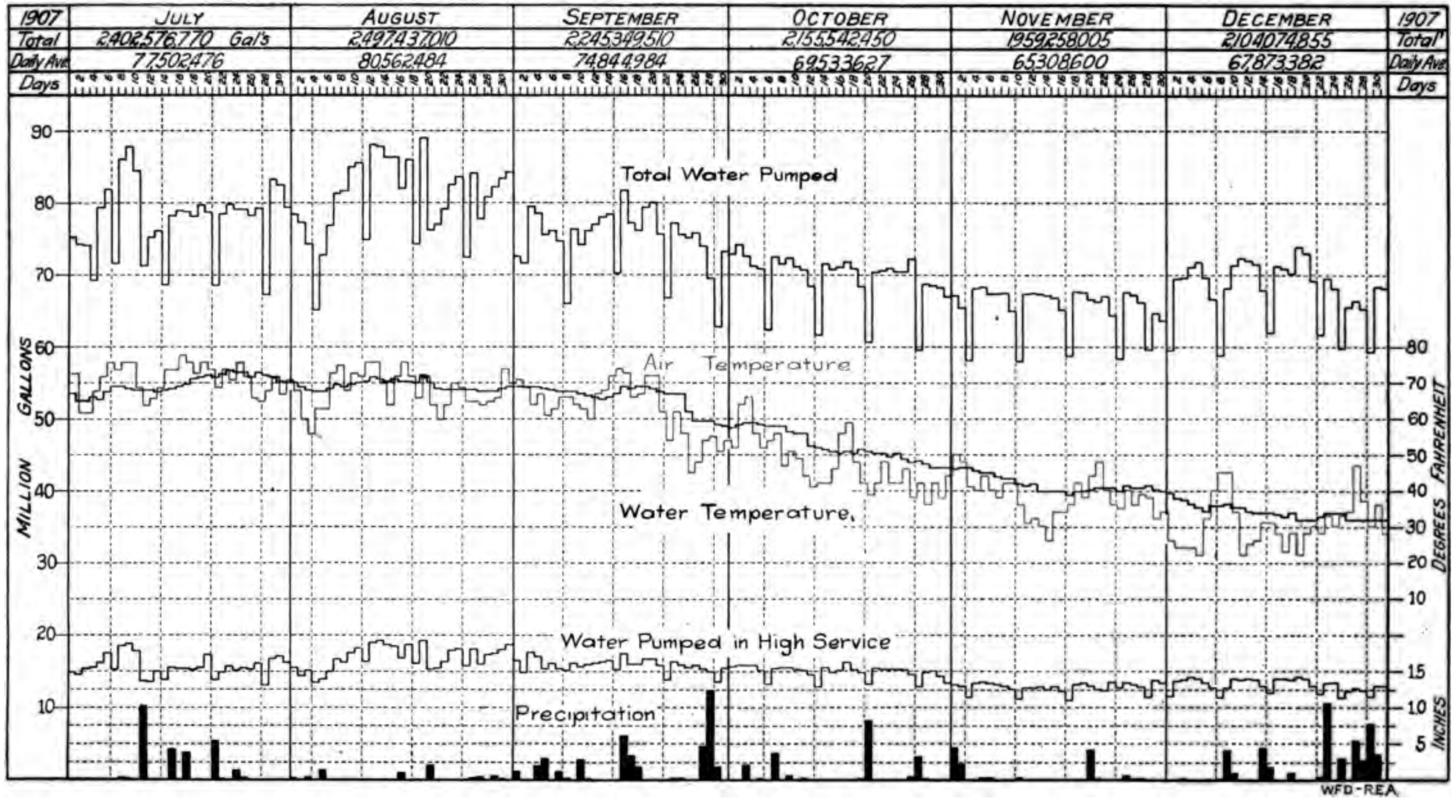
PLACE	GALLONS PER CAPITA CONSUMPTION DAILY					
	1902-3	1903-4	1904-5	1905-6	1906-7	1907-8
Detroit.........................	160.0	182.8	172.8	162.4	169.1	167.8
River Rouge..................	36.0	44.1	43.3	43.6	57 0	78.4
Highland Park	83.2	93.8	71.7	61.4	65.7	59.5
Hamtramck	126.5	86.4	84.2	73.9	86.9	80.9
Ecorse.........................	......	.....	26.5	23.4	19 7	11 7
Delray........................	92.0	94.1	79.7	......	......	......
Woodmere....................	21.6	53.3	60.3	......	......	......

The maximum and minimum average daily quantity of water supplied to the high and low pressure systems is as follows:

High Pressure System.	Gallons.
Maximum Day, February 8, 1908	19,415,000
Minimum Day, November 29, 1907	10,980,000
Average Daily	14,561,471
Total for Year	5,329,498,500
Low Pressure System.	
Maximum Day, June 22, 1908	72,777,450
Minimum Day, November 24, 1907	45,574,880
Average Daily	58,818,690
Total for Year	21,527,640,695
Combined System.	
Maximum Day, June 22, 1908	91,057,950
Minimum Day, November 10, 1907	57,993,205
Average Daily	73,380,162
Total for the Year	26,857,139,195
Maximum Hour, June 22, 1908, 4 to 5 P. M.	4,921,425
Rate per Day at Maximum Hour	118,114,200
Minimum Hour, November 4, 1908 2 to 3 A. M.	1,860,220
Rate per Day at Minimum Hour	44,645,280

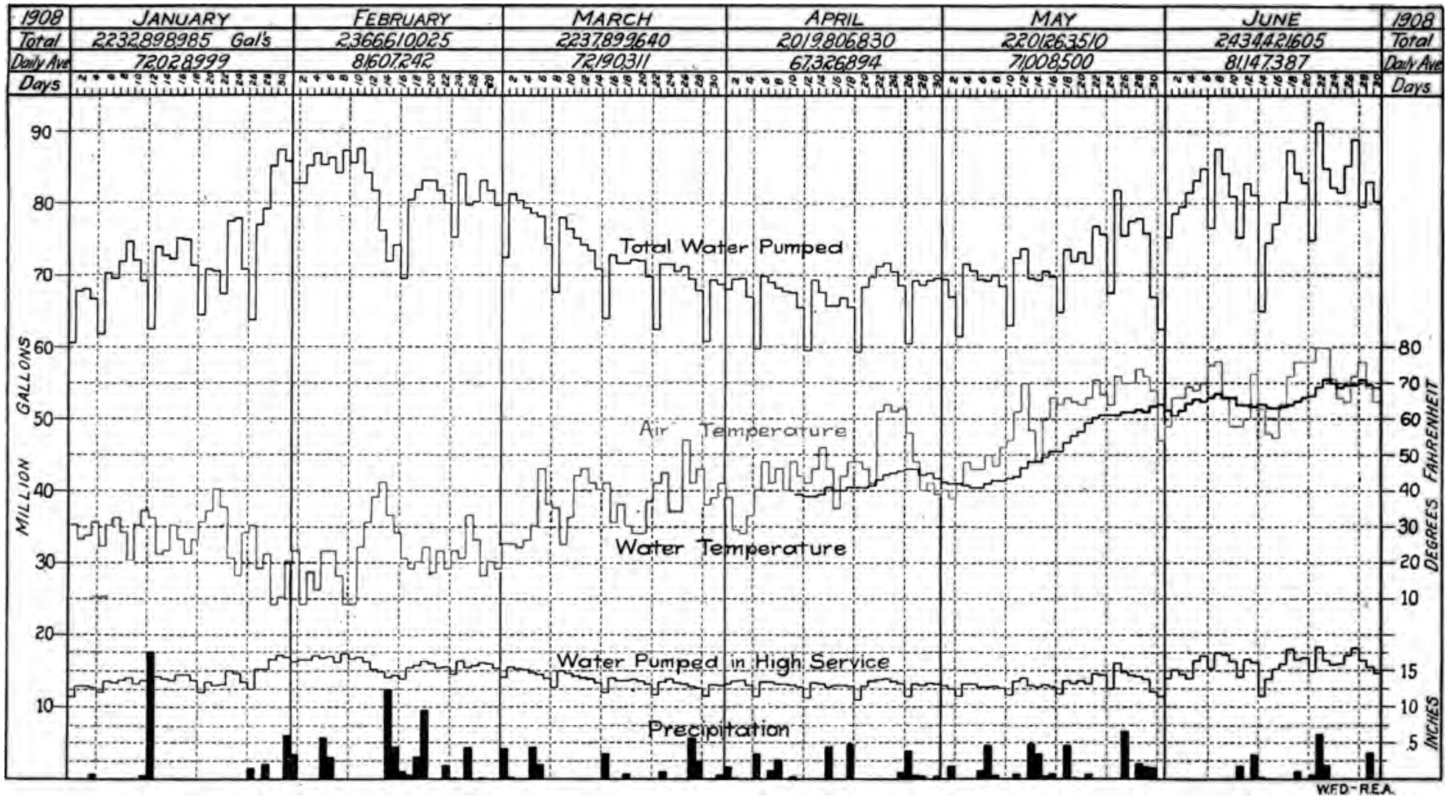
The average number of gallons pumped in the combined system has increased during the past year from 68,817,247 gallons per day to 73,380,162 per day, equivalent to 6.63 per cent. The precipitation, temperature of the air, and temperature of the water as obtained at the intake crib is shown graphically on the accompaning plates. The weather conditions during the past year have been generally favorable for light consumption.

DAILY WATER CONSUMPTION, AVERAGE TEMPERATURE AND PRECIPITATION



1907	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	1907
Total	2,402,576,770 Gal's	2,497,437,010	2,245,349,510	2,155,542,450	1,959,258,005	2,104,074,855	Total
Daily Ave.	77,502,476	80,562,484	74,844,984	69,533,627	65,308,600	67,873,382	Daily Ave.

DAILY WATER CONSUMPTION, AVERAGE TEMPERATURE AND PRECIPITATION



1908	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	1908
Total	2,232,898,985 Gal's	2,366,610,025	2,237,899,640	2,019,806,830	2,201,263,510	2,434,421,605	Total
Daily Ave	72,028,999	81,607,242	72,190,311	67,326,894	71,008,500	81,147,387	Daily Ave

The quantity of water taken from our pipes and used by the Detroit Fire Department at fires during the fiscal year, amounted to 21,474,340 gallons. There were 474 fires at which at least one engine worked not less than fifteen minutes, and water was drawn from 692 hydrants and 66 reservoirs. The average number of minutes each hydrant was used was 88.4, and each reservoir 59.0 minutes. The average number of gallons per minute was 333.5 from each hydrant, and 267.7 gallons from each reservoir.

Pressures.

Pressures at the Pumping Station during the past year have been increased 2.01 pounds on the high service and 0.88 pounds on the low service. The loss of head between the Pumping Station and the various pressure gages in the high service district has increased materially, especially in the upper Woodward district; the increased loss at Engine House No. 24 on Mott Avenue near John R. Street, amounting to 2.44 pounds. The loss of head between the Pumping Station and the various gages in the low service district also indicate a considerable increase, except in the Delray district, where the effect of the extension of the 42 inch main in Fort Street West, Campau and Jefferson Avenue West to Artillery Avenue, has increased the average pressure at Engine House No. 29 located at Jefferson and Solvay Avenues, 3.11 pounds. The effect of this forty-two inch extension, which was put in service December 9th, 1907, on pressures in the western district of the city is shown in the following table:

Week Beginning	Total City Pumpage in Million Gallons.	Average Low Service Pressures at Pumping Station	Pressures at Engine House No. 29 Solvay and Jefferson Avenues		
			High	Low	Average
Nov. 11th	309	52.34	30	19	24.90
„ 18th	299	52 48	32	18	25.72
„ 25th	359	51.89	31	19	25.85
Dec. 2nd	384	52.73	30	20	25.37
	1,351	52.36	32	18	25.54
Dec. 11th	323	52.20	33	26	29.23
„ 18th	392	52.30	33	26	29.10
„ 25th	377	53.42	34	26	29.95
Jan. 1st	376	52.03	34	25	29 68
	1,468	52.49	34	25	29.49

From the above table it appears that, although the consumption for the first four weeks the line was in service exceeded the consumption for the previous four weeks by 8.5 per cent., the average pressure at Solvay Avenue and Jefferson Avenue West was increased four pounds and the minimum pressure was increased seven pounds.

The loss of head between the Pumping Station and the Storage Yard at Orleans and Erskine Streets during the year, increased 2.03 pounds.

The accompaning table gives the pressures as obtained from hourly readings taken from thirty-five gages, located in various parts of the city.

	LOCATION OF GAUGES.	Elevat'n above City datum	Elevat'n pounds above surface pump wells 92.00 at which engine gauges are set	AVERAGE DAILY GALLONS 68,817,247 July 1, 1906, to June 30, 1907. 25,118,295,041				AVERAGE DAILY GALLONS 73,380,162 July 1, 1907 to June 30, 1908 26,857,139,195				Increase or Decrease Friction during last year		Maximum hour observed June. 22, 1908. 4,921,425 Gals 4 to 5 p. m. Daily Rate 118,114,200 Gals.		Minimum hour observed Nov. 4, 1907 1,860,220 Gals. 2 to 3 a. m. Daily Rate 44,645,280 Gals.	
				Pressures, Pounds			Fric. Loss Lbs.	Pressure, Pounds.			Fric. Loss, Lbs.	Pounds		Mean Pressure Lbs.	Fric. Loss. Lbs.	Mean Pressure Lbs.	Fric. Loss Lbs.
		Feet		High.	Low.	Mean		High.	Low.	Mean		Inc.	Dec.				
Low Service	Pumping Station	92,000	....	61	45	53.34	....	85	43	54.22	....	......	......	64 50	....	46.50	....
	Engine No. 26, Crane and Brinket	125.787	14.62	46	29	36 57	2.15	46	29	37 25	2.35	.20	......	40.50	9.38	31.00	0.98
	" No. 7, Concord near Jefferson	124.773	14.19	43	28	36.39	2.76	44	30	36.93	3.10	.34	......	39.00	11.31	32.00	0.31
	Truck No. 6, Elmwood and Fort	124.495	14.07	37	22	30 69	8.58	40	25	31 93	8.22	......	.36	30.50	19.93	29.50	2 93
	Engine No. 19, Congress near Jos. Campau	122.473	13.19	37	27	32.49	7.66	42	27	34.83	6.20	......	1.46	35.50	15 81	32.50	0.80
	" No. 2, Hastings near Congress	120.981	12 55	36	22	29 42	11.37	37	25	31.07	10 60	......	77	28.50	23.45	31.00	2.95
	Water Office, Randolph and Jefferson	125.176	14.36	34	24	28.22	10.76	33	23	28.09	11 77	1.01	......	22.00	28.14	27.50	4.64
	Truck No. 1, Wayne and Larned	116.738	10.70	37	24	30.74	11.89	36	24	30 78	12.74	.85	......	....	....	30.00	5.80
	Engine No. 3, Griswold and Clifford	123.059	13.44	38	25	29.73	10.17	35	24	28 94	11.84	1 67	......	25.00	26.06	29.00	4.06
	" No. 8, Sixth and Baker	122 144	13.05	36	23	28.43	11.86	38	23	29.55	11.62	......	.24	23.00	28.45	29.50	3.95
	" No. 4, Eighteenth near Howard	116.179	10.47	37	26	30.01	12.86	35	22	30.02	13.73	.87	......	3.000	24.03	30.50	5.58
	Truck No. 4, Twentieth near Rose	124.825	14.21	34	18	26.52	12 61	33	14	26.64	13.87	.76	......	18.50	31.79	27.00	3.29
	Engine No. 10, Sixteenth and Bagg	125.282	14.41	36	21	26.98	11.95	34	15	27 32	12.49	.54	......	15.50	34.59	27.50	4.59
	" No. 15, Hubbard near Fort	114.617	9.79	38	22	30.43	13.12	40	22	31.91	12.52	......	.60	27.00	27.71	32.00	4.71
	" No 29, Solvay and Jefferson W	115.052	9.98	31	13	23.24	20.02	35	11	26.35	17.89	......	2.13	12.00	42.52	29.50	7.02
	" No. 27, Junction and Rogers	113.736	9.41	39	21	29.95	13.98	39	19	30.89	13.92	......	.06	20 50	34.59	33.00	4.09
	" No. 14, Scotten near Michigan	121.369	12.71	37	21	28.24	12.39	35	19	28.21	13.30	.91	......	19.50	32.29	30.00	3 79
	" No. 22, Michigan near Hammond	119.444	11.88	35	18	26.50	14.96	35	15	26 60	15.74	.78	......	16.50	36.12	27 00	7.62
	Truck No. 10, Sheridan and Mack	140.254	20.89	37	19	28.65	3.80	36	22	29.15	4.18	.38	......	31.00	12.61	25.50	0.11
	Engine No 18, Mt. Elliott near Sylvester	146.233	23.48	33	17	25.55	4.33	35	19	26.17	4 57	.24	......	27.00	14.02	22.00	1.02
	" No. 11, Grandy and Gratiot	143 211	22 17	32	20	25.91	5.26	32	19	26.40	5.65	.39	......	25.50	16.83	23.50	0.88
	" No. 6, High near Hastings	142.631	21 92	29	16	20.65	10.77	28	15	20.77	11.53	.76	......	15.50	27.08	21 50	3.08
	Storage Yard, Orleans and Erskine	150.635	25.38	24	12	17.36	9.17	24	13	17.64	11.20	2.08	......	12.50	26.62	16.00	5.12
	Truck No. 5, Russell and Erskine	147.742	24.13	25	13	19 27	9.94	26	13	19.53	10.56	.62	......	17.00	23.37	19.00	837
	Engine No. 5, Alexandria near Cass	146 693	23.68	25	13	18.61	11.05	25	12	18.88	11.66	.61	......	12.50	28.82	18.50	4.32
	" No. 12 Sixteenth and Grand River	141.546	21.45	28	15	19.97	11.92	26	13	20.14	12.63	.71	......	12.00	31 05	20.50	4.55
	" No. 20, Baldwin and Gratiot	145.368	23.10	35	17	26 94	3.80	34	20	27.56	3.56	......	.24	27.50	13.90	23.50	0.10
High Service	Pumping Station	92.000	....	85	43	64.67	....	85	58	66.68	....	......	......	79.50	....	60.50	....
	Engine No. 18, Mt Elliott near Sylvester	146.233	23.48	60	31	38.39	2.80	52	30	39.69	3.51	71	......	43.00	13.02	36 00	1.02
	" No. 23, Moran and Boulevard	154.288	26 96	47	20	31.69	6.02	41	24	32 36	7.36	1 84	......	31.00	21.54	32.00	1.64
	" No. 28, Riopelle and Milwaukee	155 556	27.52	45	18	29.30	7.86	36	19	29.47	9.69	1.83	......	23.00	28.98	30.50	2.48
	" No. 13, Russell and Ferry	157.304	28.27	46	20	30.73	5.67	38	20	30.48	7.93	2.26	......	24.50	26.73	31.50	0.73
	" No. 17, Cass near Amsterdam	152 825	26.33	46	21	30.23	8.11	37	17	29 92	10.43	2.32	......	23.00	30.17	31.00	3 17
	" No. 21, Lincoln near Piquette	154.880	27.22	42	20	30.54	6.91	37	16	30.32	9.14	2.23	......	21.50	30.78	30.00	3.28
	" No. 24, Mott near John R	155.855	27.64	39	19	28.82	8.21	35	14	28.39	10.65	2.44	......	19.00	32.86	30.50	2.36

Future Extensions.

All street mains in Detroit, eight inches and over in diameter, are shown on the accompanying map, together with the principal extensions which are already needed, and which are recommended to be laid in the near future. The two principal mains which are indicated will affect pressures materially throughout the entire city, and may be described as follows:—

The first consists of the construction of a forty-eight inch main from the Pumping Station to Vinewood Avenue crossing Woodward Avenue near High Street, to better supply and reinforce the low service section of the city. At present, this section is supplied through three forty-two inch mains, which have a combined capacity of about seventy-five million gallons per day. The maximum consumption in the low service district has already reached a rate of 97,594,200 gallons per day on June 22nd, 1908, and is increasing with the growth of the city. The need of this line has been forseen by the Board, and a contract for sufficient pipe to lay from the Pumping Station to Chene Street, was awarded May 28th, 1908, and work will begin as soon as the delivery of the pipe will permit.

The second proposed extension is recommended to be forty-eight inches in diameter, and to extend from the Pumping Station to Collins St., and thence in reduced sizes to the west; and north to Highland Park. The purpose of this line is to secure increased pressures in the high service district, which includes upper Woodward Avenue and Highland Park. This territory is now supplied through a main, a portion of which is forty-two inches, and the remainder thirty-six inches in diameter, with a capacity of about twenty million gallons per day.

The consumption of water in the high service district, has reached a rate of 26,280,000 gallons per day, June 22nd, 1908, and the maximum daily consumption for each year has increased from 15,817,500 gallons in 1905-6, to 19,415,000 gallons in 1907-8.

As the engines which supply this district can pump against a pressure of 100 pounds per square inch, it has been possible to furnish a very satisfactory service; but pressures at the Pumping Station during maximum pumpage have now nearly reached their limit, and with the rapidly increasing population, pressures north of the Grand Boulevard North, will at times be low, until another force main is provided.

Distribution Pipes.

The size of the distribution pipes are generally determined by the probable regular consumption of water in the district to be supplied, and from the amount needed for fire protection. Except in special cases the size of pipes twelve inches in diameter and over is dependent on regular consumption, while for sizes under twelve inches in diameter the quantity needed for fire protection is, in a large measure, the determining factor.

The increase in the size of the smaller pipes may be shown approximately as follows: two and one-quarter and three inch logs were laid up to 1877, three inch cast iron pipe from 1878 to 1883, four inch cast iron pipe from 1883 to 1893, six inch cast iron pipe from 1885 to the present. These increases have been brought about to some extent to meet the demand for increased fire protection, and for this reason, within the territory bounded by the Boulevards, eight inch pipe has now been generally adopted; for while the carrying capacity of an eight inch pipe is about 2.1 times that of a six inch pipe, its cost in a paved street is increased but 31 per cent. and in an unpaved street 49 per cent.

In some cases it is difficult to determine the exact size of main that should be laid and which will be of sufficient size during the life of the pipe; for the size is dependent largely on the growth of population and character of buildings in the district to be supplied, and the life of the pipe will probably exceed sixty years.

New Mains and Extensions.

It is the policy of the Board to lay pipe of ample capacity not only for the present demand but for future requirements. The following large mains have been laid during the past year:—

Forty-two inch pipe in Fort Street West, from Vinewood to Campau Avenues; in Campau from Fort Street West to Jefferson Avenue West; and in Jefferson Avenue West from Campau to Artillery Avenue, a distance of 7,604 feet. This work was begun July 15th, 1907, and completed December 10th, 1907.

Forty-two inch pipe in Jefferson Avenue West, from Artillery to Solvay Avenues. Began work May 11th, 1907, and now under construction.

Twenty-four inch line in Michigan Avenue from Livernois to Larkins Streets, a distance of 2,693 feet, was completed May 7th, 1908.

Sixteen inch pipe in Livernois Street, from Michigan to Buchanan Avenues, a distance of 541 feet, was completed April 13th, 1908.

Sixteen inch pipe in Artillery Avenue, from Jefferson Avenue West to South Street, a distance of 734 feet, was completed August 25th, 1907.

Twelve inch pipe in Central Avenue from Ferndale to Michigan Avenues, a distance of 7,565 feet, was completed Nov. 1st, 1907.

Twelve inch pipe in Jefferson Avenue, from Bewick Avenue to Connors Creek, a distance of 5,595 feet was completed June 20th, 1908.

DISTRIBUTION SYSTEM

Total amount of pipe laid and discontinued in the locations named during the year ending June 30, 1908.

Size in Inches	Detroit		Ecorse		St Clair Heights	Ham-tramck	Highl'nd Park	Total Feet Laid	Total Feet Discontinued	Net Increase
	Feet Laid	Feet Disc.	Feet Laid	Feet Disc.	Feet Laid	Feet Laid	Feet Laid			
2	31	......	......	......	......	......	......	31	......	......
3	......	1,735	......	......	......	......	......	......	1,735	......
4	10	6,262	......	101	......	......	......	10	6,363	......
6	47,754	3,066	3,345	......	1,160	1,451	15,073	68,783	3,066	......
3	11,767	5,163	......	......	909	......	165	12,841	5,263	......
10	7,075	1,744	......	......	......	......	356	7,332	1,745	......
12	13,341	124	......	......	......	......	......	13,341	124	......
16	1,291	......	......	......	......	......	......	1.291	...	......
24	3,074	149	......	......	......	......	......	3,074	149	......
42	7,592	......	......	......	......	......	......	7,592	......	......
....	91,935	18,344	3,345	101	2,129	1,451	15,535	114,395	18,445	959.50
Amount in miles........................								21.66		18.17

Number of feet of pipe of the sizes indicated, inside and outside of Detroit, June 30, 1908.

Size in Inches	June 30, 1907	Laid from July 1, 1907 to Jun. 30, 1908	Disc. during year ending Jun. 30, 1908	Total Feet in System June 30, 1908	In Detroit June 30, 1908	Outside Detroit June 30, 1908
45	103	....	....	103	103	....
42	83,187	7,592	....	90,779	90,729	....
36	7,890	....	....	7.890	7.890	....
30	54,627	....	....	54,627	54,627	....
24	84,840	3.074	149	87,765	87,764	....
20	393	....	....	393	393	....
18	87	....	....	87	87	....
16	55,939	1,261	....	57,230	56,415	815
12	72,006	13 241	124	85,223	77,195	8,028
10	315,619	7,432	1,745	221.306	214,274	7,032
8	434,392	12,841	5,263	431,970	374,995	56,975
6	1,814.226	68,783	3,066	1.879,943	1,663,364	216,579
4	866,731	10	6,363	860,378	824,328	36,050
3	62,079	....	1,735	60,344	60,344	....
2	4.593	31	....	4.624	4.624	....
....	3,746,712	114.395	18.445	3,842,662	3,517,173	325,479
Total in miles.......				728.78	666.13	61.74

Breaks in Mains.

The only break of a serious nature, occured at 5:30 P. M. February 12th, 1908, in a thirty inch pipe in Gratiot Avenue between Randolph and Brush Streets, and was reported at 5:35 P. M. The crew left the Emergency Station at 5:42 P. M., another crew left the Storage Yard at 5:55; and at 6:50 a complete shut-off had been made and the street was free of water, notwithstanding that the pavements were covered with slush and ice. Repairs were completed and water turned on at 8:00 P. M. February 13th. The broken pipe was laid in 1886, and at the point of the break was of standard thickness. No evidence of the effect of electrolysis was found and volt-meter readings taken February 14th, indicated that the street car rails were positive to the pipe from five to six and one-half volts, and that the earth was positive to the pipe from 0.35 to 0.47 of a volt.

Flushing Pipes.

As formerly, all dead ends have been blown-off at intervals of about three weeks. Eighty-three complaints of bad water have been investigated and twenty-nine flushings have been made to remedy the trouble.

Fire Mains.

At a meeting of the Board held April 14th, a letter was received from the Fire Commission requesting that sixty-nine lines of pipe be laid for fire protection. This request was referred to the Committee on Extension and Construction, and a report with estimates of cost is now being prepared.

Pipe has been laid for fire protection the past year as follows:

2,751 feet of 8 inch pipe cost	$3,742.29
2,836 feet of 10 inch pipe cost	4,055.07
	$7,797.36

Private Fire Lines.

There are 157 plants which have private fire systems connected to street mains. These plants are visited regularly, and 420 inspections were made during the year.

New Pumping Station.

Plans for a new Pumping Station are now being prepared by architects, working with your Civil Engineer. The general design of this station may be described as follows:

The main building or engine room will be 75 feet wide by 285 feet long, inside measurements, and will have a capacity for six 30,000,000 gallon pumps. Two wells, each 47 feet wide by 114 feet long, are provided in the first floor for the pumping engines. The basement will be 22 feet deep, and the height from basement floor to crane 66 feet. The water gallery, 18 feet wide by 30 feet deep, will extend along the rear of the engine room for its entire length, its roof forming a terrace; and will be connected to the gate wells, intake tunnels and pumps.

A one story structure in the rear of the main building will connect the engine room with the boiler house, and will contain offices and employee's rooms on the first floor, and oil and storage rooms and shops in the basement.

The boiler house will be about 61 feet wide by 153 feet long, and will accommodate boilers of 3,500 H. P. capacity, of any commercial type. Space will be provided for the ash handling apparatus, smoke connections to chimneys and auxiliary machinery, under the boiler house, and this basement will be thirteen feet high.

A coal house of 12,000 tons capacity, sufficient for a winter's supply, will be located in the rear of and adjacent to the boiler house; and will contain elevated bins which will be loaded with a cable railway running on an elevated viaduct from the slip. Automatic dump cars will run from the viaduct, on tracks suspended from the roof-trusses, depositing the coal uniformly over the building. The bottom of the bin will be approximately 12 feet above the floor line of the boiler house. Magazine cars will run under each row of bins in the coal house to the furnaces, where the coal will be dumped directly into the magazines. The use of this plan dispenses entirely with any hand shoveling of coal or the use of coal handling machinery, and provides an easy method of handling fire in the coal bunkers. In case of a threatened strike at the mines, 7,000 tons of coal can be stored below the bins on the main floor of the coal house.

Storage Yard.

The following additions and improvements have been made at the Storage yard:—

A brick storage shed 82 feet long by 32 feet wide, has been constructed in the east yard, and a brick storage shed 108 feet long by 30 feet wide in the west yard, at a total cost for labor and material of $4,158.20.

A contract for a ten-ton locomotive crane was awarded by the Board to the Browning Engineering Company, Cleveland, Ohio, January 28th, 1908, for $4,600.00 and the crane was tested at the Storage Yard February 12th. The cost per ton of unloading pipe from cars by hand and with the crane is as follows:

SIZE PIPE.	BY HAND.	WITH CRANE.
6"	$ 0.278	$ 0.065
8"	0.254	0.047
10"	0.196	0.034
12"	0.278	0.0333
16"	0.295	0.024
24"	0.175	0.019

The railway tracks and sidings have been re-lined and ballasted, and the old ties and rails have been renewed.

Emergency Station.

The emergency station contains an air chamber with a capacity of 1,000 cu. ft., a 5 H. P. single phase motor, an air compressor, and two electric trucks with charging apparatus. The air chamber was put in service January 8th, 1908, at 10:00 A. M., and has been in continuous use since that time.

The air chamber is connected directly to the 42 inch force mains in Jefferson Avenue and in Champlain Street. The charts made by two recording pressure gages indicate that the ordinary water hammer on the twenty-four inch line connected to the forty-two inch Jefferson Avenue main, has been reduced from about twelve pounds to about three pounds and that the ordinary water hammer on the Champlain Street forty-two inch main has been reduced from about ten pounds to about four pounds. The water does not surge in the tank and readings are taken of its elevations at short intervals.

On February 25th, 1907, an Emergency Crew of twelve men divided into three watches of one foreman and three men each, went on duty in a building in the rear of the Chief Engineer's house at the Pumping Station Grounds; and this crew was moved into its permanent quarters in the Emergency Station December 31st, 1907. The foreman and one man on each watch make a daily examination of the gates on one shut-off of the force mains, and by varying the shut-offs examined from day to day, each foreman is enabled to examine all gates on the force mains once in about thirty-five days.

Coal Shed.

Plans and specifications for a new coal shed to be located between the present sheds, have been prepared as directed by the Board, March 11th, 1908. Proposals for this work were opened and the contract awarded to J. H. A. Haberkorn for $10,868.00 on June 23rd, 1908. The shed will be 194½ feet long, 39 feet wide and will have a depth from the bottom of the conveyor track to the floor of sixteen feet. The plans provide for brick and concrete walls, carried on reinforced concrete beams and piles at the south end, and steel roof trusses.

The five foot brick conduit which leads to and supplies engines Nos. 1 and 2 with water, passes length-wise under the center of the new shed, its top being 16 feet below the shed floor. In order to strengthen this conduit, 106 supports were put in place during the month of May. These supports were made of two inch double extra strong steel pipe and provided with adjusting nuts, cast iron bearing plates and footings made of eight inch channels, weighing 18¾ pounds per foot. Forty-four vertical supports spaced four foot centers and thirty-two horizontal supports spaced six foot centers were placed in the conduit under the shed; and seventeen vertical and thirteen horizontal supports were placed in the branches just south of the shed. The junction well in this conduit at the south end of the shed, was strengthened by a brick lining.

Abandoned Intake Crib.

On November 9th, 1907, the Steamer J. C. Wallace grounded on some obstruction in the river near the foot of Orleans Street. The Corps of Engineers, U. S. A., made an examination of the river at this point and found it to be an abandoned intake, and to consist of a large iron strainer surrounded by piles, located about 240 feet from the dock. It is probable that this intake strainer was placed in 1871 to supply the Pumping Station which at that time, was located at the foot of Orleans Street. As directed by the Board May 5th, specifications have been prepared for its removal.

Intake and Anchor Ice.

During the season of navigation, one man is at all times located on the Intake Crib in the Detroit River near the upper end of

Belle Isle. The crib was unoccupied from December 22nd, 1907, to April 8th, 1908. During the season there was an entire absence of trouble with anchor ice at the intake and in the settling basin.

Electrolysis.

In making repairs to the eight inch pipe at the River Rouge crossing, September 1907, the bolts in the ball joints were found badly corroded. It was found, on investigation, that most of the day the pipe was negative to the rails from 2.5 to 3.0 volts, but readings made ten seconds apart at the rush hour showed the pipe generally positive, the average value being 0.82 volt. Since the pipe was repaired the Detroit United Railway has put in a copper bond to protect the pipes at this point.

The last electrical survey of the gas and water pipes in the city was made jointly by the Detroit City Gas Company and the Board in September and October 1905.

Microscopical Water Analysis.

A considerable number of the cases of bad water reported to the Board are due to certain harmless minute vegetable and animal growths which are found in the water. In order to better understand this subject and to carry on flushing of pipes in a more systematic manner, microscopical water analyses have been made since February, and quantitive examinations from April 27th to date.

Hydraulic Elevators.

There are now thirty-six hydraulic elevators in service, two of which were added the past year. During the fiscal year all elevator connections were inspected and the amount of water hammer caused by each carefully determined. Previous to this time no regular inspection had been made since 1900.

Beginning December 2nd, 1907, systematic determination of the water hammer for each elevator has been made, and where conditions were of a serious nature, the owners were notified and endeavors made to correct the trouble. At present thirty are equipped in a satisfactory manner, and changes in the remaining six are now being made to improve their condition.

Office.

Work in the office of the Engineering Department and Construction Department has been carried on in a highly efficient manner. Mr. Clarence W. Hubbell, formerly Civil Engineer to the Board, resigned his position October 15th, 1907, to go to the Philippine Islands, as Principal Assistant Engineer, Department of Sewer and Water Works Construction at Manila. Mr. W. Edgar Hewitt, Chief Draftsman, was acting Civil Engineer from October 15th, 1907, to January 1st, 1908.

Work performed at the Pumping Station, during the year ending June 30th, 1908.

	Material	Cartage	Labor	Total Cost
Building wall around inside of manhole in 5ft. tunnel	$ 63 28	$ 10 57	$ 152 59	$ 226 44
Bracing tunnel between two coal sheds	879 38		63 60	942 98
Operating large gates and keeping water low in Settling Basin			169 75	169 75
Digging for leak			33 09	33 09
Locating ⅝ in. lead pipe			12 00	12 00
Setting 42 gates and discontinued hydraulic gates	2,477 49	57 78	1,222 69	3,757 96
Repairing furnace			45 60	45 60
Fixing curb			11 00	11 00
Filling holes in coal sheds		3 00	1 25	14 25
Total	3,420 15	71 35	17,21 57	5,213 07

Pipe in System Outside of Detroit

Number of Feet of Pipe laid and Discontinued during the following years.

LOCATION	Size	1891 Laid	1892 Laid	1893 Laid	1894 Laid	1895 Laid	1896 Laid	1897 Laid	1899 Laid	*1901 Laid	1902 Laid	1903 Laid	1904		1905 Laid	1906 Laid	1907		1908		Total Disc't	Total of Each Size	Total of Each Village
													Laid	Dis'ct			Laid	Disc't	Laid	Disc's			
Fairview	6																259					259	
"	8														4,689		2,027					6,716	6,975
St. Clair Heights	6			6,930		3,641									806		5,178	2,249	1,160		2,249	15,466	
"	8																7,491	278	969		278	8,182	
"	10																49					49	
"	12																3,813					3,813	27,510
Leesville	8						3,0 9															3,009	3,009
Hamtramck	4		3,541									7,442	6,034		1,330		2,401					20,748	
"	6	3,135			8,376			141	534			25,853	333,03		3,280	1,100			1,451			77,178	
"	8											4,964	67,12									11,676	
"	10											2,394										2,394	111,991
Highland Park	4							7														7	
"	6						18,137	508	3,395				6,005		3,742	10,486	6,632		15,073			63,978	
"	8							41	235				778						105			1,159	
"	10						3,457	700	75										357			45,89	
"	12						4,200	15														4,215	
"	16						815															815	74,763
State Fair Line	8														9,392							9,392	9,392
LaSalle Gardens	4							2,330														2,330	
"	6							10,617		255												10,872	
"	8							261														261	13,463
River Rouge	4									7,031	651		33,40									11,022	
"	6									19,595	25	13,96	2,375	17,82	11,782						1,782	33,390	
"	8									7,410												7,410	51,822
Ecorse	4												2,044							101	101	1,943	
"	6												11,671				425		3,345			15,441	
"	8												9,170									9,170	26,554
Total each year		3,135	3,541	6,930	8,376	3,641	29,618	14,620	4,239	34,291	676	42,048	81,432	......	35,021	11,586	28,275	......	22,460	......	4,410	Gd. Total	325,479

* 18 Months

61 miles 3,399 feet,

Gate System, June 30th, 1908

SIZE	42-in.	36-in.	30-in.	24-in.	20-in.	18-in.	16-in.	12-in.	10-in.	8-in.	6-in.	4-in.	3-in.	TOTAL
Murdock	5	....	11	16	....	...	27	48	182	445	1,596	1,230	11	3,571
Flowers	20	....	9	18	....	....	....	....	39	49	245	433	20	838
Galvin	....	1	7	12	....	....	21	....	13	31	170	240	1	496
Michigan Brass and Iron Works, and S. S and Valves	8	....	9	2	11	....	13	14	71	157	768	105	....	1,158
Pittsburgh	....	....	....	16	....	2	1	1	10	12	31	111	....	184
Roe Stephens (Scott)	...	....	....	....	....	....	..	5	1	6	43	....	....	55
Eddy	....	....	....	....	....	....	....	....	15	3	5	8	....	31
Scowden	....	....	....	....	....	....	....	....	7	18	48	12	....	85
Ludlow	....	....	....	....	....	....	....	....	1	2	9	4	....	16
St. Louis	....	....	..	....	....	..	....	4	....	....	....	....	....	4
Detroit Water Works	23	4	3	6	....	..	10	56	128	252	1,143	323	....	1,948
Prong	....	....	....	....	....	....	....	....	....	....	1	....	....	1
Boston	....	....	....	....	. .	....	....	....	...	1	1	....	....	2
Newport	....	....	....	....	....	....	...	....	....	....	....	1	....	1
Name unknown	....	....	....	....	...	....	....	....	....	3	9	32	1	45
Total	56	5	39	70	11	2	72	128	467	979	4,069	2,499	33	8,430

Gates set for Shut-off from July 1, 1907 to June 30th, 1908

SIZE	42-in.	24-in.	16-in.	12-in.	10-in.	8 in.	6-in.	4-in.	Total
Detroit Water Works —City	8	2	5	16	18	34	92	18	193
Pittsburg —City	....	1	....	....	....	....	....	....	1
St. Louis —City	....	....	....	1	....	....	...	....	1
Scott —City	....	....	....	....	....	....	1	....	1
Mich. Brass & Iron Wks. and Smith, Sleeves and Valves } City	....	....	....	....	1	3	6	....	10
Detroit Water W'ks-St. Clair H'ghts	....	....	....	....	....	2	2	....	4
Detroit Water Works-Ecorse	....	....	....	....	....	....	13	....	13
Detroit Water Works-River Rouge.	....	....	....	...	....	1	2	....	3
Smith, Sleeves & Valves-River Rouge	....	....	....	....	....	....	....	B.O. 1	B.O. 1
Detroit Water Works-Hamtramck...	...	....	....	....	....	....	3	....	3
Detroit Water Works-Fairview	....	....	....	....	....	....	1	....	1
Detroit W.W. for hydrants-Fairview	....	....	....	....	....	....	2	....	2
Detroit Water W'ks-Highland Park	....	....	....	....	....	....	14	....	14
Detroit W.W. for hydrants-Highland Park	....	....	...	...	....	....	21	....	21
Total	8	3	5	17	19	40	157	18	267

Shut-off Gates Discontinued

SIZE	42-in.	10-in.	8-in.	6-in.	4-in.	Total
Detroit Water Works	....	....	2	2	3	7
Murdock	....	4	5	9	29	47
Galvin	....	....	....	1	2	3
Michigan Brass & Iron Works......	2	....	....	2	....	4
Smith, Sleeves and Valves.........	....	..	....	4	1	5
Pittsburg	....	....	....	....	4	4
Flowers..........................	....	....	2	....	1	3
Eddy	....		....	1	....	1
Ludlow	.	....	...	....	1	1
Total...........................	2	4	9	19	41	75

Blow-off Gates Set from July 1st, 1907, to June 30th, 1908

4-in.	6-in.	8-in.	12-in.	Total
68	8	4	1	81

Blow-off Gates Discontinued

4-in.	3-in.	Total
20	1	21

Total Average Cost of Wells Built over Gates.

OVER OLD LINES

	No.	Size	Material	Cartage	Labor	Total Cost	Average
	3	12"	$ 53 59	$ 6 10	$ 34 74	$ 94 43	$ 31 48
	7	10"	102 86	14 04	60 28	177 18	25 31
	13	8"	175 64	47 93	119 87	343 44	26 42
	19	6"	242 31	64 87	196 92	504 10	26 53
	23	4"	300 96	98 21	255 78	654 95	28 48
Totals	65	.. ..	$ 875 36	$ 231 15	$ 667 59	$ 1,774 10	....

Wells Over New Lines

(Cost included in Pipe Lines)

42" Gate Wells	6
24" Gate Wells	4
16" Gate Wells	4
12" Gate Wells	18
10" Gate Wells	19
8" Gate Wells	37
6" Gate Wells	140
4" Gate Wells	14
Total	242

Wells in System	4,559

General Work not otherwise reported

KIND OF WORK	No.	Labor	Material	Horses & Wagons	Total Cost
Service Cocks inserted ...... 1-in. ⅝-in.	949 3192	$ 2,200 81	$ 2,286 97	$ 598 49	$ 5,085 77
Service Cocks disconnected	46	99 37	11 09	22 70	133 16
Service Connections lowered	....	2 51	1 70	1 84	6 05
Service Cocks and Tapping for Water Works .... 1-in. ⅝-in.	13 7	27 45	16 91	7 72	52 08
Sleeves and valves put in	112	722 78	1,920 95	113 24	2,756 97
Sleeves and valves disconnected...	2	71 53	97 37	17 76	186 66
Setting meters and testing pipe....	....	105 64	800 78	13 02	919 44
Drinking fountains set.	24	1,233 59	970 18	168 87	2,372 64
Private wells built over sleeves and valves and old lines............	25	140 19	360 39	62 99	563 57
Gate wells examined, repaired, set to grade, etc....................	....	1,161 04	546 63	177 44	1,885 11
Gates set, examined, repaired, etc..	....	2,443 27	672 15	217 98	3,333 40
Gate and stop-boxes located, repaired, set to grade, etc.........	....	304 38	84 78	81 00	470 16
Leaks in mains	78	1,194 72	388 48	175 45	1,758 65
Leaks in service connections.......	415	1,044 66	30 03	229 14	1,303 83
Pressure and recording gages examined, read, etc.	....	67 44	0 53	13 31	81 28
Examining connections	....	6 40	......	1 82	8 22
Examining elevators	....	50 33	......	13 60	63 93
Fireplants examined, etc............	....	302 02	1 06	81 45	384 53
Hydrants examined and oiled	....	4 72	......	1 04	5 76
Air valves put on, examined, etc...	....	18 59	1 00	5 10	24 69
Plumbing and steam-fitting	....	443 65	1 34	7 87	452 86
Dead-end blow-offs opened..........	6,704	2,200 14	......	43 05	2,243 19
Blow-offs repaired, drained, etc.....	....	286 47	182 79	57 00	526 26
Bad water, flushing, etc.............	86	235 71	......	49 26	284 97
No water	72	93 71	......	25 41	119 12
Water hammer......................	....	5 95	... ..	1 62	7 57
Short supply	95	111 30	1 72	29 87	142 89
Letting on water	47	38 60	......	10 71	49 31
Shutting off water (vac., n.p. and repairs)	171	175 02	2 25	42 48	219 75

General Work not otherwise reported—continued

KIND OF WORK	No.	Labor	Material	Horses & Wagons	Total Cost
Air chambers set, emptied, and well built	....	83 86	38 87	10 01	82 74
Streets, walks, etc., repaired........	....	462 57	26 06	54 75	543 38
Pipe laid and lowered on Belle Isle	....	46 90	112 56	6 63	166 09
Pipe caulked for D. U. R............	....	6 72	0 68	1 04	8 44
Cutting out expansion joints at Hurlbut and Jefferson...........	....	3 25	......	0 59	3 84
Pipe laid for plumber	....	9 41	..... .	......	9 41
Mains secured........................	....	6 85	......	1 63	8 48
Changing connections of mains....	....	208 21	114 46	6 88	324 55
Exposing and getting depth of mains for engineer.............	....	25 34	0 25	5 92	31 51
Surveying with engineers....	....	29 69	......	5 26	34 95
Putting in bedroom at crib.........	....	2 50	21 85	0 65	25 00
Pumping out cellar and ditches....	....	18 90	......	2 52	21 42
Work in main off ice cellar	....	16 68	......	......	16 68
Carting dirt from 42-in. main, laid last year at Jeff. and Summit ..	....	207 85	......	143 93	351 78
Miscellaneous cartage...............	.	417 87	......	259 09	676 96
Emergency Station expenses	....	8,592 92	1,059 34	62 81	5,843 25
Cost of brick buildings for supplies at Storage Yards.....	....	2,127 22	1,941 75	89 23	4,158 20
Totals		$27,001 23	$11,694 92	$2,922 17	$37,748 50

Subway Work.

SUBWAY	Pipe Laid	SIZE	Pipe Re-Laid	SIZE	Lowered Pipe	SIZE	Lead Pipe Laid	SIZE	Lead Pipe Re-laid	SIZE	Lead Pipe Lowered	SIZE	Cartage	Material	Labor	Cost	Credit	Actual Cost
 Scotten....	...... 130'	.. 8	...... 379'	.. 8	121' 37'	8 6	100' 50'	1 ⅝	....	.. ...	50' 125'	1 ⅝	.... $ 34 66	.... $ 576 73	.... $ 946 80	.... $1558 19	.... $122 80	.... $1435 39
23rd	......		408'	6	201'	6	100'	1	....		132'	⅝	22 50	369 58	888 59	1280 67	111 16	1169 51
Vinewood..	149'	24	312'	6	22' 398' 688'	8 6 24	2' 87' 25'	1 ⅝ 1	234'	⅝	195'	⅝	193 84	1,438 38	4,418 37	6,050 59	371 84	5,678 75
24th.......	......	..	689'	8	186'	8	504'	⅝	....		....	...	22 49	470 19	1,080 52	1,573 20	125 10	1,448 10
14th.........		..	514'	6	....	..	....	..	50'	⅝	....	..	10 88	311,51	532 79	855 18	31 72	823 46
Clark ...	142'	8	376' 48'	8 6	316' 22'	6 8	50' 120'	1 ⅝	....	..	....	..	34 70	605 56	1,111 49	1,751 75	83 00	1,668 75
16th	......	..	595'	6	....	..	......	..	....	..	....	..	6 98	88 02	587 68	682 68	....	682 68
Total ..	.... 272' 149'	.. 8 24	...... 1444' 1877'	.. 8 6	351' 952' 688'	8 6 24	...... 2776' 761'	.. .. ⅝	.... 284'	.. .. ..	.... 50' 452'	.. 1 ⅝	.... 326 05	.... 3,859 97	.... 9,566 24	.... 13,752 26	.... 845 62	.... 12,906 64

Pipe Lowered and Abandoned.

STREET	Feet Lowered	Feet Abandoned	Material	Cartage	Labor	Total Cost
South 8" and 10" line	....	500' of 8"	....	... ...	....	....
	....	1185' of 10"	104 96	10 61	52 23	167 80
Fort 12" line......	3079' of 12"	....	75 29	19 51	2149 24	2244 04
			$ 180 25	$ 30 12	$2,201 47	$ 2,411 84

Pipe Laid Inside the City From July 1st, 1907, to July 1st, 1908.

Date.	LOCATION	Feet	Size	COST OF CONSTRUCTION										
				Pipe	Specials	Lead	Gates	Sundries	Gate-well	Hauling	Repaving	Sup. & Eng.	Labor	Total Cost
May 15,	**Anderson** crossing Fort	78	6-in.	$29 77	$ 56	$9 47	S S & V $28 00	$5 82	$23 73	$2 29	....	$4 88	$95 65	$ 200 17
Oct. 31,	**Alexis** crossing Jefferson, Ecorse	475	6-in.	292 83	14 93	21 55	27 74	11 73	21 03	16 25	....	23 75	111 52	541 33*
July, 10,	**Artillery,** from Jefferson to South	734 20	16-in. 6-in.	1,562 58	44 80	101 60	240 12	55 23	219 25	125 67	....	37 70	1,116 27	3,503 22
June 10,	**Alter** crossing Jefferson	596	6-in.	224 84	25 01	18 94	23 03	22 97	19 57	28 31	....	22 85	551 49	937 01
Sept. 12,	**Alley** south of Baker from Eighth to Tenth	870	6 in.	491 30	50 38	55 64	45 36	36 49	77 55	23 54	....	43 80	628 93	1,452 99
Nov. 28,	**Alger** crossing Oakland	257	6-in.	144 67	....	7 89	....	8 54	....	4 63	...	12 85	67 56	246 14
Aug. 21.	**Buena Vista** crossing Oakland, Highland Park	133	6-in.	82 07	....	7 79	...	10 45	....	7 13	....	6 65	45 86	159 95†
July 3,	**Beacon,** from St. Antoine to Beaubien	503	8-in.	270 28	14 96	18 94	39 90	23 65	25 96	14 46	....	21 35	445 33	874 83
Aug. 24,	**Boulevard N.** crossing Lawton	281	6-in.	157 10	12 40	14 51	25 22	8 33	22 67	9 38	....	14 05	108 50	372 16
Aug. 31,	**Bingham,** from Cadillac to Hurlbut, also Hurlbut crossing Bingham	326 255	6-in. 6-in.	326 08	8 83	24 19	25 22	7 00	23 48	11 00	....	29 05	140 64	595 49
Aug. 25,	**Boulevard N.** crossing Second	153	6-in.	85 33	....	7 26	....	8 01	....	2 63	....	7 65	60 42	171 30

Sept. 21,	**Belvidere** crossing Lewis	467	6-in.	268 35	11 88	19 35	15 12	1 90	22 87	7 75	....	23 35	152 48	518 05
June 9,	**Bulwer** crossing Martin Pl	376	6-in.	145 32	6 75	11 05	10 10	2 47	....	8 87	....	7 48	114 55	306 59
Apr. 11,	**Brush,** from Madison to Gratiot	554	8-in.	294 85	41 83	34 73	40 15	107 98	54 38	47 91	355 63	28 40	810 11	1,815 97
Nov. 26,	**Boulevard,** (McDougall) from Hendrie to Medbury	210	6-in.	118 68	....	4 94	....	80	....	4 50	....	10 50	96 06	235 48
Nov. 26,	**Beniteau** crossing Jefferson	339	6-in.	187 06	14 98	15 77	48 22	11 13	23 48	10 00	...	16 95	229 06	556 65
Apr. 14,	**Boulevard N.** crossing Second, also Second crossing Boulevard	351 14	6 in. 8-in.	205 55	10 28	13 82	20 20	14 88	....	6 34	....	17 55	141 26	429 88
Apr. 23,	**Boulevard N.** crossing Hamilton Boulevard	713	6-in.	277 72	13 56	18 94	23 03	13 91	19 55	15 02	..	35 65	318 43	735 81
July 17,	**Beals** crossing Charlevoix	109	6-in.	60 47	1 10	4 84	....	59	....	4 51	....	5 45	34 25	111 21
July 10,	**Boulevard E,** from Farnsworth to Frederick	265	6-in.	146 36	8 01	12 10	10 10	8 61	....	6 01	....	13 25	126 72	331 16
July 16,	**Boulevard W.** crossing Hancock	77	6-in.	42 38	1 10	4 84	....	2 99	....	2 26	....	3 85	34 67	92 09
July 13,	**Boulevard N.** crossing Jos. Campau	297	6-in.	167 28	7 30	12 10	...	1 19	....	7 00	....	14 85	99 06	308 78
July 5,	**Boulevard E.** crossing Waterloo	411	6-in.	232 26	....	17 70	15 12	1 51	23 31	5 50	....	20 55	106 46	422 41
Aug. 20,	**Boulevard N.** crossing Chene Westerly	662	6-in.	372 98	9 93	24 19	25 22	9 46	23 00	10 20	....	33 10	833 49	841 57
Sept. 29,	**Buhl,** from McClellan to Holcomb, also Holcomb crossing Buhl northerly	594 914	6-in. 6-in.	847 69	28 58	58 05	40 34	9 16	46 05	25 82	....	75 40	815 01	1,446 10

Pipe Laid Inside the City From July 1st, 1907, to July 1st, 1908.

Date.	LOCATION	Feet	Size	COST OF CONSTRUCTION										
				Pipe	Specials	Lead	Gates	Sundries	Gate-well	Hauling	Repaving	Sup. & Eng.	Labor	Total Cost
Sept. 30,	**Boulevard E,** from Piquette to Trombley........	494	6-in.	$275 22	$12 50	$20 26	$15 12	$4 11	$23 32	$7 25	....	$ 24 70	$281 76	$664 24
Sept. 30,	**Boulevard,** (McDougall,) crossing Hendrie.....	94	6-in.	50 86	8 75	7 26	25 22	2 44	23 92	6 38	....	4 70	76 55	206 08
Oct. 9,	**Bewick** crossing Mack St. Clair Hts............	556	6-in.	341 95	11 80	21 29	16 63	2 55	24 33	8 63	....	27 80	156 63	611 61‡
Oct. 14,	**Boulevard E,** north of Mack......................	411	6-in.	228 83	7 63	16 93	....	9 79	22 26	7 48	....	20 55	144 73	458 20
Oct. 28,	**Boulevard W,** south of Hancock..................	96	6 In.	54 25	..	3 57	....	22	...	4 19	...	4 80	28 33	95 86
Oct. 25,	**Broadway** crossing Jefferson westerly Ecorse..........	471	6-in.	290 34	14 36	21 55	27 74	12 62	HYD. 40 70 WELL 21 03	16 49	....	23 55	111 52	579 90*
May 29,	**Beard,** from Lexington to Army.........	486	6-in.	188 80	11 70	15 79	12 93	1 29	19 12	13 70	....	9 37	111 40	384 10
Apr. 30,	**Boulevard E.** south of Gratiot..................	509	6-in.	198 60	4 96	14 21	10 10	2 21	20 34	3 39	....	9 97	145 22	409 00
May 23,	**Boulevard E,** east of Dubois......................	158	6-in.	61 11	....	4 74	....	51	. ..	3 35	....	3 64	75 77	149 12
May 22,	**Boulevard,** (McDougall) south of N. Boulevard	225	6-in.	86 57	11 58	11 05	59 10	4 68	48 33	3 49	....	7 51	75 58	307 89
Sept. 14,	**Clark,** north of Wabash R. R	366	8-in.	245 78	23 43	26 55	39 27	15 48	....	10 58	....	15 80	339 08	715 97
Mar. 30,	**Cass and State,**	8	6-in.	1 57	8 36	6 31	S S & V 27 00	2 47	...	4 03	....	3 46	65 62	118 82

Nov. 25,	**Clippert,** from Southern to Dennis..........	953	6-in.	534 66	17 90	39 43	30 24	10 92	46 96	15 57	....	47 65	386 84	1,080 17
Nov. 16,	**Cicotte** crossing Southern........................	347	6-in.	194 40	8 30	11 83	15 12	9 80	24 16	8 51	....	17 35	95 92	385 39
Oct. 24,	**Central,** from Michigan to Dix	4,795	12-in.	6,569 15	120 45	398 19	180 20	31 29	121 83	221 33	....	241 40	2,203 35	10,087 19
Sept. 20,	**Central,** Ferndale to Dix, also Ferndale from Caspar to Dix...............	2,770 385	12-in. 8-in.	4,086 23	35 75	239 54	128 30	103 78	187 72	127 28	....	159 15	4,510 58	9,528 33
Nov. 26,	**Cottage Grove,** from Woodward to John R, Highland Park.........	845	6-in.	520 37	17 77	34 73	44 37	14 66	24 83	28 04	....	42 25	266 02	993 04†
May 27,	**Copeland,** north of Jefferson........	379	6-in.	147 28	4 96	9 47	23 03	7 55	19 54	12 77	....	10 87	210 02	445 49
Oct. 21,	**Calvert,** west of Hamilton Boulevard.......	816	6-in.	459 45	11 95	36 88	15 12	3 55	23 26	11 89	....	40 80	277 10	880 00
July 28,	**Connecticut,** from Brush to Oakland, Highland Park......	694	6-in.	428 99	5 03	26 61	16 63	4 94	....	12 88	....	34 70	257 46	787 24†
July 5,	**Charlotte** crossing Florence also **Florence** from Charlotte to Joseph also **Joseph** crossing Florence, Ecorse..............................	101 280 462	6-in. 6-in. 6-in.	522 87	16 34	19 08	70 64	8 69	24 33	37 26	....	42 15	197 00	938 36*
July 9,	**Canfield** crossing Van Dyke	208	8-in.	162 68	11 48	9 68	34 25	6 53	23 04	9 64	....	10 40	98 00	365 70
Mar. 24,	**Congress,** and McDougall.................. ...	12 8	10-in. 8-in.	10 05	12 17	25 26	S S & V 150 00 GATE 26 65	6 58	22 66	22 82	....	12 19	249 98	538 36
June 19,	**Clippert,** from Michigan to Adrian.........	1,629	8-in.	891 38	35 91	59 98	39 90	21 82	41 10	35 47	....	41 91	555 82	1.723 29
Aug. 8,	**Courtland** east of Hamilton Boul'd also **Richton** crossing Hamilton Boul'd also **Hamilton Boul'd** from Courtland to Richton, Highland Park...........................	50 1,319 357	6-in. 6-in. 10-in.	1,269 33	27 17	90 47	61 00	34 99	49 71	46 16	....	86 30	507 48	2,172 61†

Pipe Laid Inside The City From July 1st, 1907, to July 1st, 1908.

Date.	LOCATION	Feet	Size	COST OF CONSTRUCTION										
				Pipe	Specials	Lead	Gates	Sundries	Gatewell	Hauling	Repaving	Sup. & Eng.	Labor	Total Cost
July 30,	**Candler,** from Woodward to Oakland, Highland Park	2,610	6-in.	1,616 47	38 14	122 40	144 15	45 73	47 82	84 64	....	130 50	793 52	3,023 37†
Aug. 13,	**Connecticut** crossing Oakland also Oakland crossing Connecticut, Highland Park	33 105	6-in. 8-in.	107 67	6 99	9 74	16 63	93	24 83	8 64	....	6 90	74 42	256 75†
July 2,	**Dorchester** crossing McClellan easterly	420	6-in.	236 79	8 15	23 60	25 22	8 82	23 54	7 26	....	21 00	170 31	524 69
July 30,	**Dane,** from Mt. Elliott to Ellery	638	6-in.	358 85	5 68	21 77	15 12	2 14	22 66	11 76	....	31 90	256 72	726 60
July 16,	**Dey** crossing Wabash R R	214	6-in.	119 81	1 18	10 33	...	4 73	....	6 88	....	10 70	106 73	260 36
Aug. 1,	**Defer Place,** from Jefferson to Kercheval	957	6-in.	588 77	18 04	55 88	HYD 80 40 GATES 61 00	28 06	25 00	37 01	13 32	47 85	398 12	1,353 45
Aug. 5,	**Dequindre.** from Pierce to Scott	239	8 in.	184 38	10 83	33 86	R S & V 77 00 GATES 10 10	5 92	50 59	4 83	....	11 95	257 99	647 45
Oct. 12,	**Dillon,** north of Holden	64	6-in.	36 16	2 85	3 04	10 10	3 62	....	2 50	....	3 20	32 16	93 63
Nov. 6,	**Dubois** crossing Boulevard N, also Boulevard N, from Dubois easterly	62 21 340	8-in. 8-in. 6-in.	255 83	18 08	11 83	25 22	5 66	23 16	14 39	....	21 15	240 84	616 16
Oct. 21,	**Castleton** crossing Conant, Hamtramck	275	6-in.	168 49	9 63	13 02	27 73	6 21	23 67	3 03	....	13 75	65 11	830 64‡
Oct. 5,	**Coooper,** from Shoe Maker to Chapin	1,174	6-in.	661 76	13 80	48 38	30 24	4 84	46 25	17 20	....	58 70	383 30	2,264 47

Sept. 16,	**Cameron,** north of Holbrook	747	6-in.	421 02	11 88	29 03	....	1 19	....	14 41	....	87 35	179 72	694 60
Aug. 27,	**Canfield,** east of Van Dyke	367	8-in.	289 10	....	19 35	....	53	....	10 01	....	18 35	98 50	435 84
Aug. 23,	**Canton** crossing Harper northerly	456	6-in.	257 70	2 85	19 35	25 22	5 76	22 64	9 63	....	22 80	136 92	502 87
Aug. 26,	**Canton,** south of Mack	182	6-in.	101 16	....	7 28	...	8 42	....	4 50	....	9 10	72 41	202 87
June 5,	**Chippewa,** south of Gratiot	617	6-in.	240 57	11 70	15 79	....	1 78	....	11 40	....	11 47	177 61	470 32
Nov. 27,	**Clark** crossing Wabash R. R.	142	8-in.	111 86	....	5 94	....	7 36	....	7 00	....	7 10	185 76	325 02
May 2,	**Carper** crossing Buhl	106	6-in.	40 74	4 96	3 16	23 03	2 02	19 91	9 44	...	3 07	19 52	125 85
May 2,	**Crane,** north of Forest	86	6-in.	32 90	7 30	3 16	....	42	....	4 07	....	1 90	27 99	77 74
May 12,	**Cottrell** crossing Fort	80	6-in.	30 55	56	9 47	S S & V 28 00	34	19 28	2 40	....	4 39	85 15	180 14
May 1,	**Crane,** north of Lambert	109	6-in.	41 91	7 30	6 31		47	....	4 31	....	2 45	38 96	101 71
May 22,	**Delray,** north of Jefferson	182	6 in.	70 51	8 15	6 31	....	61	....	3 37	...	3 40	45 29	137 64
Oct. 28,	**Euclid,** east of Third	178	6-in.	98 33	3 83	6 89	....	1 15	....	8 00	....	8 90	80 70	207 80
May 16,	**Elton** crossing Jefferson, Ecorse	22	6-in.	9 05	5 24	3 48	14 22	1 56	22 27	3 28	....	2 27	33 70	95 07*
Oct. 28,	**Euclid,** from Hamilton Boul'd easterly	841	6-in.	473 01	19 53	30 88	25 22	9 33	22 16	13 82	....	42 05	277 98	913 98
Aug. 31,	**Edison,** from Second easterly	351	6-in.	197 79	7 30	14 51	....	1 31	....	11 00	....	17 55	104 17	353 68

Pipe Laid Inside the City From July 1st, 1907, to July 1st, 1908.

Date.	LOCATION	Feet	Size	COST OF CONSTRUCTION										
				Pipe	Specials	Lead	Gates	Sundries	Gate-well	Hauling	Repaving	Sup. & Eng.	Labor	Total Cost
June 16,	**Elmwood**, from Hendricks to Hunt	194	8-in.	101 56	16 92	9 47	10 25	8 01	....	8 80	....	8 69	192 82	356 52
Sept, 19,	**F.** crossing Vinewood..........	37	6-in.	20 34	....	6 45	15 12	7 94	....	1 47	....	3 25	45 11	99 68
Dec. 17,	**Fort**, from Vinewood to Campau also **Campau** from Fort to Jefferson, also **Jefferson** from Campau to Clark, also **Jefferson** from Summit to Ferdinand.................	841 1,565 843 267 41	42-in. 42-in. 42-in. 42-in. 8-in.	37,508 51	2,325 04	1,983 29	2,343 38	Sp'cial work inc. labor & mater'l 1,124 78 lumber 416 79 sundr's 205 89	1,850 70	1,600 47	Sand cement concre-, ting 604 20 1,846 89	1,919 00	26,854 08	80,583 02
July 20,	**Ferris** crossing John R., easterly Highland Park	447	6-in.	276 04	5 67	21 29	27 74	8 62	REPAIR 2 65	10 50	. ..	22 35	132 82	507 68†
Aug. 26,	**Frederick**, from Mt. Elliott to Moran	431	6-in.	243 57	....	19 35	. .	56	....	9 39	....	21 55	120 75	415 17
Sept. 14,	**Fox**, from Alexandrine to Frank.......	357	6-in.	199 42	6 93	14 51	15 12	13 88	23 16	18 41	3 03	17 85	289 93	602 24
Oct. 16,	**Frontenac**, north of Hyde............	449	6-in.	252 11	1 10	16 93	....	8 65	....	10 38	....	22 45	127 06	438 68
Sept. 8,	**Fifteenth** crossing Warren northerly..................	370	10-in.	397 03	19 80	36 88	31 75	25 18	29 98	18 90	....	18 50	357 45	935 47
Sept. 4,	**Fifteenth** crossing Merrick southerly.................	691	10-in.	745 50	22 50	50 74	38 05	78 84	49 59	13 82	....	34 55	675 90	1,709 49
Sept. 1,	**Fifteenth**, from Merrick to Kirby also **Kirby** from Fifteenth to Fourteenth. ...	296 338	10-in. 10-in.	678 61	23 23	48 68	52 10	50 45	51 36	28 68	...	31 70	573 25	1,538 06

Aug. 17,	**Fisher** crossing Jefferson northerly*	232	24-in.	812 47	767 80	246 74	2,115 30	85 87	715 43	144 14	....	16 55	2,807 72	7,662 02
Oct 29,	**Fifth,** from Jefferson to Sunnyside, Ecorse	397	6-in.	243 71	19 39	18 89	27 74	8 50	21 74	13 90	....	19 85	105 84	479 56*
June 1,	**Fifteenth,** from McGraw to Marquette	932	6-in.	362 33	13 28	25 26	23 03	3 37	19 70	17 83	....	18 80	287 06	770 68
May 14,	**Fisher** crossing Waterloo southerly	691	6-in.	269 89	7 51	18 94	12 93	2 06	20 34	15 41	....	13 57	195 78	556 43
May 8,	**First** crossing Jefferson, Ecorse	24	6-in.	9 91	5 24	3 48	14 22	1 89	22 10	3 76	....	2 22	28 31	91 13*
Oct. 9,	**F.,** west of Vinewood	151	6-in.	85 33	....	7 38	10 10	92	16 63	....	....	11 76	106 34	238 46
Dec. 2,	**Goodwin,** north of Holbrook	390	6-in.	219 83	...	11 83	....	8 96	....	9 89	....	19 50	107 88	377 89
June 1,	**Goodwin,** north of Holbrook	268	6-in.	104 59	7 30	7 39	....	63	....	11 51	...	6 07	111 31	248 80
Sept. 27,	**Glynn Ct.,** west of Woodward	305	6-in.	172 36	....	14 75	....	1 63	....	13 99	....	15 25	109 67	327 65
Oct. 19,	**Garland.** South of Mack. St. Clair Hts	604	6-in.	371 29	7 98	26 61	16 63	4 40	23 97	7 88	....	30 20	184 83	673 79*
July 6,	**Gilbert,** from Waterloo to Charlevoix	1,308	6-in.	510 01	18 80	31 57	12 93	1 37	19 91	18 67	...	26 15	432 86	1,072 27
Aug. 3,	**Green,** south of McGill	74	6-in.	41 82	....	5 02	....	28	....	4 50	....	3 70	32 92	88 24
July 15,	**Gates** crossing Wabash R. R.	214	6-in.	119 24	6 30	10 33	....	1 46	....	6 50	....	10 70	106 27	260 80
July 27,	**Goethe,** East of McClellan	58	6-in.	32 78	....	2 36	....	10	....	3 00	....	2 90	19 00	60 14
May 4,	**Green** crossing Wabash	284	6-in.	110 85	....	9 47	....	1 03	....	8 92	....	5 80	116 31	252 38

Pipe laid from July 1st, 1907, to July 1st, 1908—continued.

Date	LOCATION	Feet	Size	COST OF COSNTRUCTION										
				Pipe	Spec-ials	Lead	Gates	Sun-dries	Gate-well	Haul-ing	Re paving	Sup. & Eng.	Labor	Total Cost
Sept. 23,	**Hamilton,** from Jefferson to Kercheval.......	1,042	8-in.	$816 11	$10 20	$49 74	$24 15	$4 04	$23 88	$ 26 00	....	$52 10	$470 27	$1,476 49
Sept. 12,	**Hamilton Boulevard,** from Atkinson to Edison also **Edison** crossing Hamilton Boul'd.	350 256	10-in. 6-in.	517 96	8 53	33 87	25 22	7 91	23 01	15 94	....	30 30	277 26	940 00
May 20,	**Hickory** crossing Clark easterly	205	8-in.	110 84	8 41	9 66	30 05	4 96	19 80	8 14	....	7 32	101 17	300 35
May 11,	**Hamilton,** from Kercheval to Waterloo.....	1,060	8-in.	412 86	10 51	37 88	19 95	3 48	20 34	20 52	....	17 69	358 85	902 08
Apr. 17,	**Hooker** crossing Lawton westerly	435	6-in.	170 39	64	12 63	12 93	81	19 82	8 53	...	21 75	129 27	376 77
June 23,	**Iroquois,** north of St. Paul.................	67	6-in.	25 46	2 21	2 89	10 10	1 22	19 54	4 45	..	1 54	14 55	81 96
June 26,	**Jefferson,** from Bewick to Connor's Creek..	5,595 391 94 10 31	12-in 6-in. 8-in- 4-in. 2-in.	5,425 63	338 76	467 24	SS&Y 11 50 GATES 285 30	223 41	Inc. repairs 320 58	292 73	Service connec-tions, labor, mate'al 1,542 04	325 71	4,122 71	13 355 61
June 13,	**Joy** crossing Third..............................	479	8-in.	372 61	12 90	29 08	39 27	23 24	46 88	21 83	....	23 95	380 71	950 42
May 19,	**James** crossing Jefferson, Ecorse.................	24	6-in.	9 91	5 24	3 48	14 22	1 56	22 99	3 76	....	2 32	31 68	95 16*
Apr. 16,	**Hancock** crossing Lawton also **Lawton** from Hancock to Warren....................	429 342	6-in. 6-in.	300 44	8 81	15 79	10 10	1 67	19 34	13 22	....	38 55	195 57	603 49
Dec. 2,	**Hurlbut,** north of Sylvester...............	27	6-in.	14 13	....	1 19	....	19	....	1 88	....	1 35	16 02	34 76

July 10,	**Hudson** crossing Greenwood	59	6-in.	31 65	5 20	7 88	30 24	7 64	Repr's 26 67	4 32	....	2 95	100 58	216 63
July 6,	**Helen,** south of Mack	208	6-in.	117 55	....	10 33	10 10	5 86	....	4 95	....	10 40	59 97	219 16
June 2,	**Hurlbut,** north of Kercheval	207	6-in.	80 30	....	3 95	12 93	25	....	3 78	....	4 01	59 80	165 02
June 1,	**Harper** crossing McClellan	144	6-in.	55 62	4 96	3 93	10 10	1 44	....	5 62	...	2 80	30 51	114 98
June 16,	**Helen,** from Mack to Charlevoix	1,428	6-in.	557 40	17 12	36 30	12 93	1 48	20 23	12 28	....	24 36	806 70	988 80
Sept. 14,	**Herbert,** from Lorett to 28th	292	6-in.	165 02	14 88	14 51	....	1 11	....	7 75	....	14 60	95 25	313 12
Sept, 7,	**Helen,** north of Waterloo	153	6-in.	86 46	....	5 90	....	24	....	6 60	....	7 65	89 14	145 99
Oct. 17,	**Horatio** crossing Martin also **Martin** crossing Horatio	166 210	8-in. 10-in.	356 54	11 30	25 08	24 15	1 91	22 66	12 64	...	18 80	164 64	637 72
May 23,	**Jeffers n,** from Village Line westerly, Ecorse	58	6-in	26 79	20 36	9 33	107 25	4 81	....	14 64	....	8 48	156 16	347 82*
Sept. 15,	**Jerome,** north of Jefferson.	3 15	6-in.	178 02	....	12 10	....	2 86	.....	5 38	....	15 75	65 75	279 86
Sept. 3,	**Jean,** west of McClellan, Hamtramck	12	6-in.	7 46	....	97	...	06	....	....	....	....	3 88	12 37‡
Oct. 23,	**Jefferson,** from Clark to Summit. Force main and connections	1,092 10 65 30 27	42-in. 6-in. 8-in. 12-in. 10-in.	11,705 81	402 49	685 58	1,140 90	lumber 259 54 Sund's 138 20	416 43	Sp'cial work inc. labor and material 1.330 02 1,074 10	Sand cement concreteing 416 25 Repy'g 381 09	728 65	11,600 27	30,309 33

Pipe laid from July 1st, 1907, to July 1st, 1908—continued.

Date	LOCATION	Feet	Size	COST OF CONSTRUCTION										
				Pipe	Specials	Lead	Gates	Sundries	Gatewell	Hauling	Repaving	Snp. & Eng.	Labor	Total Cost
Dec. 14,	**Jefferson,** from Ferdinand to Artillery. Force main and connections	2,996 88 65 10 16	42 in. 8-in. 6-in. 10-in. 16-in.	31,855 79	1,676 78	1,939 21	2,430 69	Lumber 196 37 Sundries 87 25	Sewer Repairs 81 27 Gatewell 951 24	.... 1,168 11	Sand Cement Concre'g 625 35 Repavi'g 1,764 85	1,353 79	11,379 81	55.510 01
June 23,	**Jefferson W.,** (reseting hydrants) D. S. R. R. to Laferty	13	6-in.	5 39	....	2 12	....	12	....	13 25	....	3 58	35 76	60 22
Oct. 15,	**Kercheval,** east of Connor's Creek	802	6-in.	450 40	10 25	33 87	....	10 86	....	24 08	...	40 10	394 88	963 94
May 21,	**Kellogg,** from Baldwin to Van Dyke	500	6-in.	195 07	3 36	12 63	25 86	1 33	41 00	9 77	....	11 98	190 32	491 32
May 14	**Knox crossing** Jefferson, Ecorse	21	6-in.	86 2	5 24	3 48	14 22	1 56	22 27	2 64	....	2 24	31 68	91 95*
Nov. 15	**Leicester Court,** west of Oakland	84	6-in.	47 47	36	3 42	....	....	....	2 25	....	4 20	22 75	80 45
Dec. 2,	**Lafayette Boulevard,** east of Scotten	61	6-in.	17 35	....	2 85	....	17	....	5 25	....	3 05	20 50	49 17
Apr. 30,	**Lucky Place,** south of Harper	35	6-in.	13 71	....	1 23	....	14	....	69	....	....	10 49	26 26
Apr. 13,	**Livernois,** from Michigan to Buchanan	541	16-in.	793 03	67 20	63 14	237 10	35 81	140 70	59 90	....	58 59	895 77	2,401 24
May 4,	**Lafayette Boulevard,** east of Scotten	122	6-in.	47 00	85	3 08	....	2 99	....	3 84	....	2 17	28 85	88 78

Sept. 27,	**Lamson,** south of Pallister................	42	6-in.	23 74	....	2 95	....	19	....	2 63	....	2 10	16 92	48 53
Aug. 26,	**Leslie,** east of Van Dyke.................	140	6-in.	77 98	....	7 28	....	29	....	8 00	....	7 00	46 87	142 42
Aug. 12,	**La Belle** crossing Woodward westerly, Highland Pk.	606	6-in.	372 41	14 36	26 61	44 37	11 30	23 91 Inc. repairs	17 26	.....	30 30	190 42	730 94†
June 29,	**Larned,** from Russell to Hastings.........	1216	8-in.	654 13	52 67	47 36	71 25	56 29	27 96	26 09	...	52 59	1,134 05	2,122 39
June 10,	**Lewerenz,** south of Regular	62	6-in.	23 50	3 55	1 58	....	29	....	3 00	..	1 28	19 19	52 39
June 6.	**Milford,** from McGraw to Vinewood.......	490	6-in.	188 41	16 88	18 94	25 86	5 17	40 14	11 25	....	12 56	193 38	512 59
June 24,	**Minnie,** from Fort southerly........	598	6-in.	233 07	13 13	15 40	11 40	16 43	20 23	14 06	....	16 71	344 55	684 98
July 16,	**Monroe** crossing Canton	105	6-in.	57 64	7 50	9 68	15 12	1 34	22 28	9 01	....	5 25	67 94	195 76
July 8,	**Medbury,** from Rivard to Russell...........	307	10-in.	330 14	12 25	24 19	....	3 71	....	8 44	....	15 35	160 06	554 14
July 23,	**Maxwell** crossing Warren southerly.................	684	6-in.	266 36	13 59	17 36	12 93	1 46	20 23	6 77	....	15 09	264 84	618 63
Aug. 28,	**McDougall,** from Ferry to Palmer............	399	6-in.	222 66	6 15	16 93	15 12	12 76	.. .	8 88	....	19 95	116 32	418 77
Aug. 28,	**Maxwell** crossing Waterloo	142	6-in.	73 55	2 93	7 28	25 22	5 98	23 16	5 25	....	7 10	48 87	199 34
Nov. 1,	**Maxwell,** north of Mack	340	6-in.	190 45	1 10	9 86	7 99	....	.....	7 26	....	17 00	77 77	311 48
Oct. 31,	**Medbury,** from Hastings into alley east of Hastings to alley south of Harper thence to alley west of Rivard.	540	6-in	301 21	11 60	19 71	15 12	15 05	22 83	11 88	....	27 00	231 14	655 54

Pipe laid from July 1st, 1907, to July 1st, 1908—continued.

Date	LOCATION	Feet	Size	COST OF CONSTRUCTION										
				Pipe	Spec-ials	Lead	Gates	Sun-dries	Gate-well	Haul-ing	Re-paving	Sup. & Eng.	Labor	Total Cost
May 23,	**Martin,** from Michigan to Bulwer also Bulwer crossing Martin, also Clayton crossing Martin..........	1,906 47 936	10-in. 6-in. 10-in.	2,131 28	46 20	101 02	92 88	21 73	86 08	115 76	....	87 75	915 08	3,597 87
May 25,	**Mills** crossing Frontenac Boulevard.............	171	6-in.	65 42	11 25	7 89	23 03	2 05	20 91	5 79	....	5 43	77 53	219 30
May 1,	**Michigan,** from Livernois to Markey	1,018 28 15	24-in. 10-in. 8-in.	3,647 53	146 90	176 79	324 90	134 58	164 88	138 62	581 00	138 60	1,889 27	7,343 07
May, 16,	**Michigan,** from Larkins to Markey also **Markey** crossing Michigan.......	1,675 56	24-in. 6-in.	6,011 99	260 28	271 50	45 81	165 19	Sewers 22 75 Wells 83 24	190 88	984 22	278 83	4 108 76	12,423 40
Oct. 21,	**Norwalk** crossing Conant easterly Hamtramck......	699	6-in.	430 85	19 69	35 05	27 73	7 80	23 34	25 13	....	34 95	168 33	767 87‡
July 2,	**Napoleon** crossing Rivard westerly....................	429	8-in.	333 22	17 75	24 19	24 15	21 29	22 13	17 01	....	21 45	431 56	912 75
July 22,	**Oakland,** and D. U. R. at Woodland Ave..	4	8-in.	3 47	12 07	2 60	....	1 61	....	1 00	....	....	25 64	46 39
May 21,	**Oneida** crossing Jefferson	294	6-in.	114 38	4 96	9 47	23 03	6 61	....	11 82	....	9 47	189 49	369 23
Nov. 15,	**Owen,** east of John R....................	154	6-in.	86 46	....	6 41	....	8 27	...	5 51	....	7 70	43 38	157 73
May, 19,	**Plummer** crossing McKinstry..........................	122	6-in.	46 61	14 28	6 31	10 10	4 44	....	5 33	....	3 33	45 25	135 65

Nov. 29,	**Palmer,** west of Moran......	92	6-in.	50 86	....	2 99	.....	43	....	1 50	....	4 60	35 73	96 11
Nov. 30,	**Palmer,** east of Helen......................	59	6-in.	32 21	....	2 00	....	41	....	1 50	......	2 95	29 79	68 86
Nov. 30,	**Palmer,** east of Brush.........	87	6-in.	46 91	4 90	2 99	10 10	5 26	....	5 13	....	4 35	50 28	129 92
July 22,	**Porter,** west of Vermont..................	124	12-in.	176 34	40 01	35 70	44 00	4 87	32 36	25 14	....	6 20	187 20	551 82
May 16,	**Pennsylvania,** crossing Moffatt northerly......	447	6-in.	174 31	2 97	11 05	12 93	1 04	20 02	14 05	....	9 16	130 00	375 58
Oct. 10,	**Pennsylvania** crossing Moffatt southerly..........	280	6-in.	155 67	....	9 91	....	10 08	....	4 38	....	14 00	57 25	251 29
June 24,	**Regular** crossing Dragoon..........................	34	8-in.	14 74	23 14	5 01	19 95	1 45	....	3 61	....	2 26	22 31	92 47
May 12,	**Ridge** crossing Jefferson, Ecorse.................	21	6-in.	8 62	5 24	3 48	14 22	2 04	22 27	3 04	....	2 22	29 93	91 06*
Aug. 20,	**Stanley** crossing Tillman westerly	310	6-in.	174 62	3 15	14 51	15 12	9 02	22 71	10 25	....	15 50	108 29	373 17
July 24,	**St. John,** from Woodard to Oakland, Highland Park..	2,652	6-in.	1,640 10	40 67	95 79	44 37	13 14	50 38	44 33	....	132 60	1,013 54	3,074 92†
July 20,	**Stevens** crossing Brush easterly, Highland Park..	248	6-in.	152 94	4 59	10 64	16 63	63	23 69	14 10	...	12 40	99 35	334 97†
July 17,	**Scotten,** from McGraw to Cobb also **Mc-Graw** crossing Scotten............	1,028 94	6-in. 6-in.	630 11	26 88	48 38	25 22	8 05	22 15	19 19	...	56 10	415 12	1,251 20
July 9,	**Superior** crossing Riopelle..................	58	6-in.	30 52	10 75	9 68	45 35	3 19	And repairs 45 53	2 19	....	2 90	98 81	248 93
May 9,	**Solvay** crossing Fort..............	79	6-in.	30 16	1 94	9 47	S S & V 28 00	2 98	22 56	1 95	....	5 10	129 62	231 78

Pipe laid from July 1st, 1907 to July 1st, 1908—continued

Date	LOCATION	Feet	Size	COST OF CONSTRUCTION										
				Pipe	Specials	Lead	Gates	Sundries	Gate-well	Hauling	Re-paving	Sup. & Eng.	Labor	Total Cost
Oct. 19,	**Shoemaker** crossing St. Jean easterly, St. Clair Hts...	312	8-in.	266 93	11 36	15 97	37 68	6 57	25 39	21 55	....	15 60	154 85	555 90*
Aug. 30,	**St Clair,** north of Kercheval...........	482	6-in.	269 56	8 10	16 93	....	9 35	...	10 38	....	24 10	142 34	480 76
Sept. 18,	**Seyburn,** from Canfield northerly..........	416	6-in.	234 53	7 30	19 35	15 12	1 57	23 51	11 38	....	20 80	120 87	454 43
Nov. 30,	**Scotten,** north of Deming..............	370	8-in.	101 62	16 77	7 84	34 25	1 58	....	6 95	....	6 50	170 74	346 25
June 10,	**Southern** crossing Livernois........................	50	10-in.	32 16	13 60	6 31	26 65	1 50	20 23	4 91	....	3 82	47 38	156 51
Aug. 17,	**Tyler,** from Second to Hamilton Boul'd. Highland Park.......................	1,499	6-in.	927 61	17 19	63 86	61 00	20 17	25 01	47 51	....	74 95	440 65	1,677 95†
July 20,	**Thirtieth,** north of Rich........	32	6-in.	18 08	....	2 07	....	14	......	4 00	....	1 60	12 25	38 14
June 5,	**Thirtieth,** from Warren to McGraw also **McGraw** crossing Thirtieth.	354 112	6-in. 6-in.	180 19	9 13	15 79	12 93	2 66	20 23	9 13	....	10 37	171 55	431 98
Sept. 24,	**28th,** crossing McGraw northerly...............	353	6-in.	198 36	4 38	17 70	25 22	7 27	22 66	6 75	....	17 65	134 34	434 33
Nov. 19,	**Thirty-First,** from Warren northerly	681	6-in.	384 29	....	23 66	15 12	10 93	23 09	15 69	....	34 05	188 06	694 89
July 9,	**St. Joseph** crossing Riopelle............................	51	6-in.	21 00	15 55	9 68	30 24	2 32	And repairs 24 72	6 00	....	2 55	109 06	221 12

Oct. 9,	**Sargent** crossing Collins	36	6-in.	19 78	2 85	2 95	10 10	4 58	....	1 50	....	1 80	18 00	56 56
Nov. 12,	**Stanley,** from Trumbull to Commonwealth	331 438	8-in. 10-in.	718 27	33 40	46 74	76 25	16 50	72 24	13 88	....	38 20	486 94	1,502 42
Nov. 16,	**Southern,** from Cicotte to Clippert	414	10-in.	445 58	5 68	19 71	....	1 90	.....	15 00	.....	20 70	164 42	672 99
Oct. 25,	**Sunnyside,** from Fifth to Salliotte, Ecorse	425	6-in.	262 98	6 49	21 55	16 63	3 73	20 03	14 98	....	21 25	111 02	478 66*
May 9,	**Second** crossing Jefferson, Ecorse	23	6-in.	9 48	5 24	3 48	11 22	1 85	21 88	3 52	.....	2 28	29 37	91 27*
June 10,	**Stephens** from Medbury Southerly	559	6-in.	217 79	13 59	15 79	12 93	1 52	20 28	8 17	....	11 30	161 94	468 26
Sept. 30,	**Stephens** crossing Moffatt southerly	230	6-in.	129 98	.....	10 33	15 12	1 97	22 66	3 50	....	11 50	89 64	284 70
Oct. 22,	**Seminole,** from St. Paul northerly	405	8-in.	316 73	6 05	15 77	10 10	2 82	20 30	8 64	.....	20 25	136 35	537 01
Oct. 19,	**St. Jean** crossing Mack southerly, St. Clair Hts	657	8-in.	565 05	12 85	37 25	37 68	5 50	25 03	15 25	....	32 85	219 33	950 79§
Nov. 23,	**Senator** crossing Springwells westerly	233	6-in.	129 41	6 00	5 94	25 22	5 68	22 26	10 07	....	11 65	98 31	314 54
July 2,	**Twenty-Third,** from Fort to Jefferson	569	8-in.	303 01	22 50	26 37	39 90	10 51	47 72	37 45	......	22 00	398 97	908 46
Nov. 26,	**Thirtieth,** north of Rich	61	6-in.	33 34	55	2 14	......	37	....	3 00	....	3 05	15 49	57 94
May 11,	**Union** crossing Jefferson, Ecorse	21	6-in.	8 62	5 24	3 48	14 22	2 11	22 99	3 04	....	2 28	31 68*	93 66*
Aug. 17,	**Victor** crossing Woodward easterly, Highland Pk.	1,134	6-in.	699 44	17 60	50 56	61 00	26 94	24 83	25 88	....	56 70	342 04	1,304 99†
Nov. 22,	**Vinewood,** north of Toledo, also lowering pipe to grade	149 38	24-in. 6-in.	561 64	138 30	59 38	41 65	59 50	261 95	155 62	Air ch'mbr & well 63 03	44 85	3,318 53	4,704 50

Pipe laid from July 1st, 1907, to July 1st, 1908—continued.

Date	LOCATION	Feet	Size	COST OF CONSTRUCTION										
				Pipe	Specials	Lead	Gates	Sundries	Gate-well	Hauling	Re-paving	Sup. & Eng.	Labor	Total Cost
Dec. 19,	**Vanilla** crossing Jefferson southerly	632	6-in.	352 64	7 26	19 71	S S & V 23 00 GATE 10 10	3 75	21 68	16 96	....	31 60	240 24	726 94
Dec. 28,	**Vanda**, from Jefferson to Edlie	942	6-in.	527 83	7 26	31 54	S S & V 23 00 GATE 10 10	4 63	21 68	26 26	....	47 10	306 86	1,006 26
Dec. 22,	**Victor**, east of Woodward, Highland Pk.	352	6-in.	215 74	4 46	13 02	16 63	12 80	....	11 48	....	17 60	120 36	412 09†
June 28,	**Wyandotte** crossing Jos. Campau westerly, Hamtramck	184	6-in.	78 41	10 70	6 95	25 33	2 16	20 02	3 55	....	5 51	73 32	225 95‡
Aug. 22.	**Weyher** crossing Pennsylvania westerly............	339	6-in.	188 18	6 43	14 51	15 12	1 51	22 83	10 76	....	16 95	150 44	426 73
June 28,	**Warren**, from Van Dyke to Parker, also **Parker** crossing Warren.........	375	6-in.	146 11	3 94	11 05	12 93	31	20 23	5 24	....	7 57	102 94	310 32
Nov. 4,	**Ward Place**, from Lawton to Maybury	468	6-in.	259 96	12 05	19 71	15 12	10 66	22 51	11 88	...	23 15	140 60	515 64
Aug. 13,	**Woodward** crossing Davison, also **Davison** crossing Woodward westerly, Highland Pk	46 987	6-in. 6-in.	632 91	26 84	53 23	61 00	17 68	25 19	29 39	....	51 65	363 10	1,260 99†
Aug. 13,	**Waverley** crossing Woodward westerly, Highland Pk	1,418	6-in.	876 63	16 50	58 54	77 63	21 97	49 66	40 54	....	70 90	493 51	1,705 88†
May 28,	**Whitehead** crossing Livernois westerly	386	6-in.	143 37	11 29	13 48	23 03	3 56	19 80	10 99	....	8 61	114 71	348 84

July 22,	**Whittaker** crossing Lawndale easterly	352	6-in.	197 23	1 48	14 51	25 22	5 90	22 83	10 88	....	17 60	62 25	357 90
July 3,	**Warren**, from Helen to Boulevard, also **Boulevard**, from Warren to Gratiot	427 278	10-in. 10-in.	756 29	45 68	53 22	55 90	15 69	46 95	25 70	....	35 25	668 40	1,703 08
July 15,	**Woodland**, from Woodward to John R.........	783	8-in.	612 87	13 13	38 70	....	5 13	23 20	19 31	....	39 15	443 39	1,194 88
Oct. 25,	**Woodward** crossing Jefferson westerly, Ecorse...	520	6-in.	321 43	10 48	21 55	27 74	9 09	21 03	18 20	....	26 00	115 22	570 74*
May 28,	**Young** crossing Steiner westerly, Hamtramck	281	6-in.	120 20	16 03	12 17	11 11	43	....	9 73	....	7 71	138 86	316 24†

* Ecorse † Highland Park ‡ Hamtramck § St. Clair Heights

Summary of the Amount of Pipe laid inside the City of Detroit and outside Villages, from July 1st, 1907, to June 30th, 1908.

LOCATION	Feet	Size	COST OF CONSTRUCTION										
			Pipe	Specials	Lead	Gates	Sundr's	Gate-wells	Hauling	Re-paving	Sup. & Eng.	Labor	Total Cost
City of Detroit............	31 10 47,754 11,767 7,075 13,341 1,291 3,074 7,592	2-in. 4-in. 6-in. 8-in. 10-in. 12-in. 16-in. 24-in. 42-in.	$147,963 91	$7,857 36	$9,455 05	$12,624 41	$7,518 98	$8,042 38	$7,098 47	$7,534 65	$8,047 42	$104,539 71	$320,682 34
Total........	91,935												
Village of Ecorse...........	3,345	6-in.	$2,025 16	$139 03	$157 86	$405 02	$72 74	$326 66	$154 76	......	$180 81	$1,123 63	$4,585 67
Village of St. Clair Heights	1,160 969	6-in. 8-in.	$1,545 22	$43 99	$101 12	$108 62	$19 02	$98 72	$53 31	......	$106 45	$715 64	2,792 09
Total.............	2,129												
Village of Hamtramck......	1,451	6-in.	$805 41	$56 05	$68 16	$91 90	$16 66	$67 03	$41 44	..	$61 92	$444 50	1,653 07
Village of Highland Park	15,073 105 357	6-in. 8-in. 10-in.	$9 81 72	$242 98	$685 28	$693 15	$244 95	$372 51	$428 48	......	$776 75	$5,140 55	18,403 37
Total.............	15,535												

RECAPITULATION OF CONSTRUCTION.

Total Pipe Laid, Gates Set and Wells Built.

	FEET	COST	TOTAL
City of Detroit,	91,935	320,682.34	
Village of Ecorse,	3,845	4,585.67	
Village of St. Clair Heights,	2,129	2,792.09	
Village of Hamtramck,	1,451	1,653.07	
Village of Highland Park,	15,535	18,403.37	
	114,395		$ 348,116.54
	$21\frac{3515}{5280}$ miles		
Gate wells built over old lines,		$ 1,774.10	1,774.10
Grand Total			$ 349,890.64

Attached find a summary of statistics in the form recommended by the New England Water Works Association. This summary has been compiled jointly by the Secretary and Civil Engineer from information obtained from all departments.

Respectfully submitted,

GEORGE H. FENKELL,

Civil Engineer.

SUMMARY OF STATISTICS.

For the year ending June 30, 1908.

In form recommended by the New England Water Works Association.

Detroit Water Works, Detroit, Wayne County, Michigan.

General Statistics.

Population by Census of 1900, 285,704.

Date of construction, 1827, to date.

By whom owned. The Board of Water Commissioners of the City of Detroit.

Source of supply, Detroit River.

Mode of supply (whether gravity or pumping), pumping.

Pumping Statistics.

1. Builders of Pumping Machinery.

One Compound Beam, Det. Loco. Wks., Detroit, Mich.

Two Compound Beam, Riverside Engine Wks., Detroit, Mich.

Three Triple Expansion
- 1. E. P. Allis & Co., Milwaukee, Wis.
- 2. Allis Chalmers, Milwaukee, Wis.

2. Description of fuel used,
- *a.* Kind, bituminous, run of mine.
- *b.* Brand of coal. Meadowbrook
- *c.* Average price of coal per gross ton, delivered f. o. b. boat, Water Works dock, $2.58.
- *d.* Percentage of ash, 7.07 per cent.
- *e.* Wood, price per cord, $—none.

3. Coal consumed for the year, 32,943,764 lbs.

4. [Pounds of wood consumed] ÷ 3 = equivalent amount of coal, no record.

4a. Amount of other fuel used, none.

5. Total equivalent coal consumed for the year = (3) + (4), same as No. 3.

6. Total pumpage for the year, 26,857,139,195 gallons.

Allowance for slip 1% for three Compound and one Triple Expansion.

Allowance for slip none for two Triple Expansion.

7. Average static head against which pumps work, direct pressure. No reservoir.

8. Average dynamic head against which pumps work,

High system 66.68 lbs. 154.0 ft.

Low system 54.22 lbs 125.2 ft.

Whole system 57.54 lbs. 132.9 ft.

9. Number of gallons pumped per pound of equivalent coal (5), 815

$$10.\quad \text{Duty} = \frac{\text{gallons pumped (6)} \times 8.34 \text{ (lbs.)} \times 100 \times \text{dynamic head (8)}}{\text{Total fuel consumed (5)}} = 89{,}342{,}124$$

Total cost of pumping per million gallons, figured on pumping station expenses, $3.06.

11. Cost of fuel per million gallons pumped, $1.52.

12. Total cost per million gallons raised one foot (dynamic), $.0116.

Financial Statistics.

RECEIPTS.

Balance brought forward	$ 66,544.87
(*a*) From ordinary (maintenance) receipts	721,349.79
(*b*) From extraordinary receipts (bonds, etc.)	26,857.36
Total,	$814,752.02

From Water Rates.

A. Fixture rates	$378,175.26
B. Meter rates	222,331.30
C. Total from consumers	600,506.56
D. For hydrants	
E. For fountains	
F. For street watering	
G. For public buildings	
H. For miscellaneous uses	
I. For General appropriation	
J. Total from municipal departments	
K. From tax levy	75,000.00
L. From bond issue	
M. From other sources	72,700 59
Balance forward	66,544.87
N. Total	$814,752.02

EXPENDITURES.

Water Works Maintenance.

AA. Operation (management and repairs)		
BB. Special:		
CC. Total maintenance		$208,966.93
DD. Interest on bonds		34,296.67
(CC+DD)		
EE. Payment of bonds		10,000.00
FF. Sinking Fund		
Water Works Construction.		
GG. Extension of mains	$461,566.57	
HH. Extension of services		

II.	Extension of meters	$ 15,341.04	
JJ.	Special:		
	Pumping Works	4,475.12	
KK.	Total construction		481,382.73
LL.	Unclassified expenses: Real estate, $2,850.00, Miscellaneous		4,375.71
MM.	Balance:		
	(*aa*) Ordinary	$	
	(*bb*) Extraordinary		
	Total balance		$ 72,879.93
N.	Total		$814,752.02
	Disposition of balance:		
O.	Net cost of works to date		$8,877,077.32
P.	Bonded debt at date		940,000.00
Q.	Value of Sinking Fund at date		63,582.89
R.	Average rate of interest, 3½ per cent.+		

Statistics of Consumption of Water.

1.	Estimated total population at date, City of Detroit	426,592
2.	Estimated population on lines of pipe	440,744
3.	Estimated population supplied	438,157
4.	Total consumption for the year	26,857,139,195 gallons
5.	Passed through meters	8,368,105,508 gallons
6.	Percentage of consumption metered	31.2
7.	Average daily consumption	73,380,162 gallons
8.	Gallons per day to each inhabitant, City of Detroit	169.9
9.	Gallons per day to each consumer	167.5
10.	Gallons per day to each tap	880.5
11.	Cost of supplying water, per million gallons, figured on total maintenance (item CC),	$ 7.78
12.	Total cost of supplying water, per million gallons, figured on total maintenance + interest on bonds	$ 9.06

Statistics Relating to Distribution System.

MAINS.

1. Kind of pipe, cast iron.
2. Sizes, from 2 inch to 45 inch.
3. Extended, 114,395 feet during year.
4. Discontinued, 18,445 feet during year.
5. Total now in use, 727.78 miles.
6. Cost of repairs per mile, $3.10.
7. Number of leaks per mile, 0.108.
8. Length of pipes less than 4 inches in diameter, 12.30 miles.

9. Number of hydrants added during year (public), 263.
10. Number of hydrants (public) now in use, 5,022—Cisterns 555.
11. Number of stop gates added during year, 243.
12. Number of stop gates now in use, 8,406.
14. Number of blow-offs, 860.
13. Number of stop gates smaller than 4-inch, 30+.
15. Range of pressure on mains, 11 lbs. to 52 lbs.

SERVICES.

16. Kind of pipe, lead, cast iron, galvanized iron.
17. Sizes, 5/8" to 10".
18. Extended........feet.
19. Discontinued........feet.
20. Total now in use..........miles.
21. Number of service taps added during year, 4,333.
22. Number now in use, 82,966.
23. Average length of service..........feet.
24. Average cost of service for the year, $......
25. Number of meters added, 603.
26. Number now in use, 7,447.
27. Percentage of services metered, 9%.
28. Percentage of receipts from metered water (B + C), 37.02.
29. Number of motors and elevators added, 3.
30. Number now in use, 36.

REPORT OF SUPERINTENDENT OF METERS AND INSPECTION.

Detroit, July 1, 1908.

To the Board of Water Commissioners:

Gentlemen:—In compliance with the rules and regulations of your honorable body, I herewith report the work done in the Meter, Inspection and Service Cocks Departments from July 1, 1907, to July 1, 1908:

Number of Meters placed from July 1, 1907, to July 1, 1908.

	SIZES								
	⅝ in.	¾ in	1 in.	1½in.	2 in.	3 in.	4 in	6 in	Total
In service July 1, 1907........	3,419	1,333	1,127	392	324	139	89	21	6844
Placed during the year ending June 30, 1908	416	120	88	26	40	14	8	5	717
	3.835	1,453	1,215	418	364	153	97	26	7561
Removed during the year ending June 30, 1908..............	52	18	24	3	8	6	1	2	114
Total number in service July 1st. 1908....	3,783	1,435	1,191	415	356	147	96	24	7.447

In Service July 1, 1908.

KIND.	SIZES								
	⅝ in.	¾ in.	1 in.	1½in.	2 in.	3 in .	4 in.	6 in.	Total
Thomson	3,776	1,429	1,164	411	349	143	84	24	7.380
Crown...........................	4	4	9	2	1	1	2	......	23
Hersey...........................	2	1	16	2	2	1	6	....	30
Worthington.........	......	1	2	......	4	2	2	......	11
Union Rotary....................	1	......	...	......	......	......	1	......	2
Keystone.........................	......	......	......	......	......	......	1	......	1
Total	3,783	1.435	1,191	415	356	147	96	24	7,447

Indicators attached to hydraulic elevator........................ 36

Meters in Stock, July 1st, 1908.

KIND	SIZES					
	⅝-in.	¾-in.	1-in.	1½-in.	3-in.	Total
Thomson	11	6	14	4	3	38
Crown	....	....	....	2	....	2
Hersey	....	....	6	....	....	6
Aggregate	11	6	20	6	3	46

Valuation of meters in stock July 1st, 1908	$ 742 00
Valuation of material on hand July 1st, 1908	675 56
Valuation of tools, etc., July 1st, 1908	679 25
Valuation of horses, wagons, etc., July 1st, 1908	454 00
Valuation of furniture, fixtures, etc., July 1st, 1908	105 00
Total valuation of stock on hand July 1st, 1908	$ 2,655 81

Valuation of meters in service July 1st, 1907		$118,606 44
Deduct for meters sold	$ 906 93	
Deduct 2 per cent. for depreciation in value	2,372 13	3,279 06
		$115,327 38
Add amount expended for meters placed from July 1st, 1907		8,284 41
Total valuation of meters in service July 1st, 1908		$123,611 79

Summary of Total Amount Expended in the Meter Department for the Years 1889 to July 1, 1908, inclusive.

	1889	1890	1891	1892	1893	TOTAL
Meters	$11,175 00	$18,700 00	$6,501 55	$12,371 82	$6,987 48	$ 55,735 80
Supt. and labor	1,734 10	8,510 57	4,841 49	8.269 17	8,980 48	32,335 81
Material, tools, etc.......	637 26	2,982 14	872 99	2,132 93	1,650 33	8,275 65
Freight, hauling, etc.....	98 05	408 97	197 11	244 08	165 12	1,113 33
Horses, wagon, etc.	....	....	.. ..	547 24	184 50	731 74
Aggregate	$13,644 41	$30,601 68	$12,413 14	$23,565 24	$17,967 86	$ 98,192 33

	1894	1895	1896	1897	1898	TOTAL
Meters	$8,824 08	$9,235 11	$10,435 76	$7,955 97	$1,790 75	$ 38,241 67
Supt. and labor..........	6,672 20	6,647 89	6,340 08	6,078 78	4,531 11	30,270 06
Material, tools, etc......	1,833 01	1,384 85	1,035 15	927 90	568 99	5.749 90
Freight, hauling, etc.....	201 18	71 40	91 11	67 90	13 16	444 75
Horses, wagon, etc.......	383 07	248 60	238 51	330 80	187 50	1,388 48
Aggregate..........	$17,913 54	$17,587 85	$18,140 61	$15,361 35	$7,091 51	$ 76,094 86

	1899	1900-1	1901-2	1902-3	1903-4	TOTAL
Meters	$2,265 70	$4,172 61	$4,801 12	$4,316 72	$4,401 82	$ 19,957 97
Supt. and labor	4,223 54	6,369 45	4,597 96	5,319 54	5,144 01	25.654 50
Material, tools, etc.......	375 82	617 71	521 69	577 61	360 45	2,452 78
Freight, hauling, etc.....	6 85	15 00	1 60	3 37	59	27 41
Horses, wagon, etc.......	244 25	321 15	220 10	238 00	473 30	1,496 80
Aggregate..........	$7,115 66	$11,495 92	$10,142 47	$10,455 24	$10,380 17	$ 49,589 46

	1904-5	1905-6	1806-7	1907-8		Total Expended since 1899
Meters	$5,238 75	$6,891 66	$10,065 13	9,191 34	....	$145,322 32
Supt. and labor..........	5,171 79	5,043 62	5,086 09	5,548 07	....	109,109 94
Material, tools, etc.......	271 09	196 67	336 11	415 77	....	17,697 97
Freight, hauling, etc.....	1 80	......	7 80	73 60	....	1,668 69
Phone and printing	88 20	62 60	100 80	74 97	....	326 57
Horses, wagon, etc.	275 50	234 50	86 96	37 29	....	4,251 26
Aggregate..........	$11.047 13	$12,429 05	$15,682 88	$15,341 04	....	$278,376 75

Inspection.

The following shows a portion of the work done by the inspectors of the different wards during the year ending June 30th, 1908:

New connections examined—City	3,945
" " " Hamtramck Village	84
" " " Highland Park	201
Extension examined	1,803
Buildings examined	8,480
Fixtures inspected	6,394
Let on new connections	3,826
Let on for building purposes	310
Let on vacancies re-occupied	487
Let on Non-payment	429
Building tax notices	4.430
Delinquents notified	24.070
Shut off for non-payment	595
Shut off for vacancy	734
Shut off for leaks	161
Inquiries for Assessor	8.509
Meters read	42,728
Meter bills delivered	25,896
Examination for leaks	16,024
Leaks reported	1,175
Total	150,781

Service Cocks.

Three thousand nine hundred and forty-five (3,945)) service connections were made the past year, (being 795 less than the previous year), and 68 were abandoned. A net gain to the system of 3,877 making the whole number in the city 80,706.

There were also 482 connections made in the adjoining villages viz: Hamtramck 84. Highland Park 201, River Rouge 70, and Ecorse 127, making the total number in the villages 2,260, and the total in city and villages 82,966. See following tables for details:

Number and Sizes of Taps inserted, and those discontinued, in each Ward during the year ending June 30, 1908.

SIZES	WARDS																		TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
⅝-inch	77	8	84	68	81	43	32	52	64	85	142	197	153	153	192	211	840	458	2,940
1-inch	98	51	40	73	24	36	21	54	10	46	23	30	34	53	74	36	128	63	894
2-inch	12	9	5	4	....	5	....	5	1	....	1	1	2	5	4	2	7	....	63
3-inch	1	5	3	2	2	1	1	1	1	1	1	....	....	2	....	....	1	....	22
4-inch	....	3	....	...	....	....	1	...	....	1	....	....	....	1	3	....	....	1	10
6-inch	2	1	1	1	....	1	....	2	....	3	1	1	1	....	1	....	1	....	16
Aggregate....	190	77	133	148	107	86	55	114	76	136	168	229	190	214	274	249	977	522	3,945
DISCONTINUED																			
⅝-inch	8	12	2	4	10	8	6	6	3	7	....	2	1	1	....	....	1	1	72
1-inch	2	3	1	3	....	3	....	6	1	1	....	1	....	....	....	....	....	1	22
Aggregate....	10	15	3	7	10	11	6	12	4	8	....	3	1	1	....	....	1	2	94

Service connections in the Villages of Highland Park, River Rouge, Ecorse and Hamtramck.

	In Use July 1, 1907						Inserted 1907-8					
	⅝ in.	1 in.	2 in.	3 in.	4 in.	6 in,	⅝ in.	1 in.	2 in.	3 in.	6 in.	Total
Highland Park.......	261	96	1	2	......	1	160	40	1	......	.. ..	562
River Rouge	690	21	......	1	1	.....	68	2	......	......	......	783
Ecorse.......	147	1	......	......	......	......	108	18	......	1	......	275
Hamtramck.	526	24	1	1	4	......	77	5	1	......	1	640
Aggregate	1624	142	2	4	5	1	413	65	2	1	1	2260

Total Number of Service Connections in the City and Adjoining Villages, July 1, 1908.

SIZE	In use July 1, 1907.	Added 1907-8	Discontinued 1907-8	Total July 1, '08
⅝ inch...........	57.015	2.940	72	59.883
1 inch..	18.639	894	22	19.511
2 inch...... .. ·····..............................	604	63	....	667
3 inch............	299	22	....	321
4 inch..	196	10	....	206
6 inch...............	94	16	....	110
8 inch..................	7	....	....	7
10 inch..	1	....	....	1
Total City..................	76,855	3,945	94	80,706
Total Villages..............	....	....	....	2,260
Aggregate..................	....	.. ....	....	82,966

Attached herewith is a complete list of tools on hand and an itemized account of material in stock in the meter and inspection departments on the first day of July '08.

All of which is respectfully submitted.

T. R. PUTNAM,
Supt. Meters and Intpection,

REPORT OF CHIEF ENGINEER AT PUMPING WORKS.

Detroit, July 1, 1908.

To the Board of Water Commissioners:

Gentlemen—I have the honor to submit the Engineer's rereport for the year ending June 30, 1908.

The following table shows the number of gallons of water pumped, and cost of fuel for the years named

YEAR	Gallons of Water Pumped.	Cost of Fuel Consumed	Average Daily Delivered.
1852	235,840,271	....	646,411
1853	303,531,743	$ 2,129 37	931,594
1854	376,265,126	2,271 34	1,030,866
1855	542,807,364	3,325 81	1,487,143
1856	692,124,305	4,017 44	1,896,231
1857	697,190,523	3,993 20	1,909,837
1858	718,091,207	3,655 20	1,967,373
1859	782,112,587	3,194 15	2,142,774
1360	870,036,451	4,196 21	2,383,580
1861	895,129,423	4,414 07	2,452,409
1862	994,945,329	3,150 95	2,725,878
1863	1,035,798,048	4,670 86	2,837,808
1864	1,018,390,256	7,647 62	2,839,078
1865	1,049,514,887	7.372 89	2,875,383
1866	1,196,317,922	9,349 16	3,277,583
1867	1,425,535,230	10,121 82	3,905,576
1868	1,666,545,125	11,379 23	4,507,248
1869	1,946,810,325	11,247 92	4,511,809
1870	1,866,060,068	12,713 78	5,112,493
1871	2,300,150,605	14,681 05	6,301,782
1872	2,782,292,578	17,736 86	7,601,892
1873	3,198,393,948	20,233 30	8,762,723
1874	3,289,872,635	20,431 71	9,013,350
1875	4,207,454,260	21,393 98	11,527,272
1876	4,065,134.470	19,832 89	11,107,499
1877	4,213,239,790	17.433 72	11,543,123
1878	4,345,743,330	10,943 82	11,906,146
1879	5,129,509,110	11,219 51	14,053,696
1880	5,552,965,310	12.276 60	15,172,036
1881	6,543,127,968	16.556 63	17,926,377
1882	6,284,000,742	13,156 16	17,261,440
1883	7,379,327,188	16,495 99	20,217,334
1884	8,510,614,140	19.877 07	23,253.044
1885	9,970,829,580	21,341 48	27,317,341
1886	10,576,571.254	20,387 24	28,976.907
1887	13,168,859.808	35,882 83	36.079.166
1888	14,380,166,670	39,568 66	39,397,716
1889	12,875,334.453	34,413 31	35,274,888
1890	12,120,944,532	31,852 40	33,209,067
1891	12.057,261,236	33,826 86	33,033,592
1892	12,476,612,482	31,034 40	34.182,499
1893	13,877,977,208	27,479 93	38,021,855
1894	13,649,779.605	29.283 47	37,396,656
1895	14,698,451,954	32,095 00	40,269,731
1896	13,254,369,371	31,186 17	36,215,123
1897	12,928,821,326	17,355 58	35,421,428
1898	14,278.682,058	17,880 19	39,092,252
1899	16,348,062,701	19,011 67	44,789,212
1900	17.077,100,477	25,898 50	46,786,576
Jan. 1 to July 1 1901	8,849.732,755	16,881 31	48,893,551
July 1, 1901 to July 1 1902	18,333,104,706	24.830 79	50.200,204
July 1, 1902 to July 1 1903	18,757,682,360	26,909 99	51,390,911
July 1, 1903 to July 1, 1904	21,734,954,284	38,461 08	59,385,121
July 1, 1904 to July 1, 1905	21,977,576 875	32,079 27	60,212,539
July 1, 1905 to July 1 1906	22,395,312,104	29.394 17	61,357,019
July 1, 1906 to July 1, 1907	25,118,295,041	37,461 48	68,817,247
July 1, 1907 to July 1, 1908	26,857,139,195	43,055 84	73,380,162

The following tables show in detail the work done by each engine each month of the year.

Engine No. 1

MONTHS	Time run		Revolutions	Gallons Pumped
	H.	M.		
July	577	25	376,340	556 677,750
August	631	10	395,160	562,021,470
September	683	30	374,480	567.666,870
October	495	30	268.570	363.496,020
November	345	05	205,325	255,553.410
December	316	35	192,015	233.953,980
January	373	40	230,150	323,106,150
February	652	30	352,535	430,588,650
March	733	15	445,810	652,234.860
April	581	15	365,735	491,748,480
May	133	15	88,465	113,489.460
June	96	10	62.970	90,306,000
Total	5,619	20	3,357,555	4 640,843,100

Engine No. 2

July	303	50	191,555	256,908,720
August	164	20	109,045	128,157,000
September	104	30	69,660	95,262,480
October	84	10	59,385	81,947,880
November	42	30	28,280	32,433,960
December	109	55	73.435	89.262,600
January	303	45	203,960	284,154,240
February	184	15	102,215	164,361,720
March	......	....	......	....
April	69	20	45,845	53,994,000
May	249	15	175,420	218,465,880
June	170	00	112,785	92,032,560
Total	1,785	50	1,171,585	1,496,981,040

Engine No. 3

July	421	55	231,845	320,715,990
August	240	45	160,350	230,052,110
September	377	10	235,735	354,794,150
October	159	00	91,565	137,864,880
November	482	15	293,305	449,099,430
December	410	15	226.160	403,402,240
January	183	55	105.040	145,910.230
February	321	15	323.310	547,652,080
March	480	40	290,910	432,871.730
April	115	05	76,515	84,784,070
May	98	00	66,845	98,095,690
June	494	50	327,530	530,160,990
Total	3,785	05	2,429,110	3,785,403,590

Engine No. 4

MONTHS	Time run		Revolutions	Gallons Pumped
	H.	M.		
July	33	45	31,220	24 507,700
August	396	50	380,860	298,975,100
September	67	35	58,800	46,158,000
October	744	00	624,750	490,428,750
November	720	00	618,325	485,385,125
December	744	00	639,745	502,199,825
January	454	20	382,055	299,913,175
February	163	55	145,755	114,417,675
March	......	....	......	....
April	716	00	645,850	506,992,250
May	744	00	681,480	534,961,800
June	619	00	605,795	475,549,075
Total	5,403	25	4,814,635	3,779,488,475

Engine No. 5

July	744	00	626,900	613.108,200
August	741	30	640,635	626,541,080
September	720	00	598,070	584,912,460
October	717	45	609,120	595,719,360
November	672	30	525,065	513,513,570
December	530	55	417,110	407,933,580
January	744	00	610,020	596,599,560
February	696	00	562,800	550,418,400
March	744	00	593,470	580,413,660
April	652	35	547,880	535,826,640
May	744	00	645,860	631,651,080
June	720	00	637,540	623,514.120
Total	8,427	15	7,014,470	6,860,151,660

Engine No. 6

July	744	00	644,845	630,658,410
August	743	15	666,350	651.690,300
September	720	00	609.975	596,555,550
October	579	35	497,020	486,085,560
November	285	15	228,295	223,272,510
December	593	50	477,835	467,322,630
January	744	00	596,335	583.215,630
February	696	00	571,750	559,171,500
March	744	00	585,255	572,379,890
April	452	45	354,255	346,461,390
May	744	00	618,200	604,599,600
June	720	00	636,870	622,858,860
Total	7,766	40	6,486,985	6,344,271,330

TOTAL EXPENSE PUMPING WATER, 1907-1908.

Fuel coal consumed	$40,982 13
Unloading coal	2,073 71
Salaries Engineers, Firemen, etc	39,033 37
Salaries men on Intake Crib	1,440 00
Repairs boiler and engine	1,396 95
Engine oil and grease	812 09
Waste and rags	213 94
Boiler and engine supplies	474 94
Packing and hose	450 20
General supplies	305 69
Electric light fixtures and supplies	11 62
Ice	50 90
Paint, lead and glass	118 50
Printing and stationery	9 90
Horse expense	31 55
Kerosene and gasoline	10 25
Boiler inspection and insurance	30 00
Telephone	40 00
Feed and bedding horse	118 19
Towel supply	65 76
Freight and express	12 10
Advertising	26 78
Hoisting apparatus repairs	33 35
	$87,741 92
Credit memo for scrap brass, barrels, etc	$225 98
Grand total	$87,515 94

The cost of fuel per million gallons pumped was $1.52, and per million gallons pumped 100 feet high was $1.16. The table shows that the amount of water pumped during the year was 26,857,139,195 gallons, making the daily average 73,380,162, which is an increase of 14 per cent. compared with the preceding year.

The total expense during the year for pumping water including maintenance, heating station, library and greenhouse, hoisting coal, etc., was $87,515.94, thus making the cost per million pumped $3.06.

The station duty of coal consumed for all purposes for the year was 89,342,124 foot pounds.

The engines are all in a fair working condition and giving satisfactory service as the duty shows.

Engine No. 2, which had foundation rebuilt has been run when required and has proven satisfactory.

The boilers are in fair condition but minor repairs have been made to them the past year. One furnace was renewed.

The painting of the engine and boiler rooms has a most desired effect making it much lighter both day and night. The buildings are all in a fair condition. It is gratifying to be able to say that we have had no serious trouble with either anchor or needle ice since receiving our entire water supply through the new intake tunnel.

The new addition to the coal sheds which is being built is a necessity. I hope the system for conveying coal through the sheds will be installed the coming winter.

The increase of water pumped as the records show, demonstrates clearly that if the increase continues as may be reasonably expected, it would be advisable to install an additional 25 million gallon pump at your earliest convenience.

Respectfully yours,

URIAH GOULD,

Chief Engineer.

SUPPLEMENT

BOARD OF MANAGERS OF DETROIT WATER WORKS

Board of Trustees appointed by Common Council, February 24th, 1852; organized March 1st, 1852.

Shubael Conant, Chairman. Edmund A. Brush.
Henry Ledyard. Wm. R. Noyes.
Jas. A. Van Dyke.

1853.

On the 16th of May, 1853, the Board of Water Commissioners of the City of Detroit was organized under an act previously approved by the Common Council and passed by the Legislature, February 14th, 1853. The term of service was determined by lot, as follows:

Jas. A. Van Dyke,	for 3 years.
Edmund A. Brush,	for 4 years.
Henry Ledyard,	for 5 years.
Shubael Conant,	for 6 years.
Wm. R. Noyes,	for 7 years.

Shubael Conant was elected President, who, finding the duties too arduous, resigned July 30th, and Edmund A. Brush was elected.

1854.

Edmund A. Brush, President, Jas. A. Van Dyke.
Shubael Conant. Wm. R. Noyes.
Henry Ledyard.

1855.

Edmund A. Brush, President. William R. Noyes.
Henry Ledyard. James A. Van Dyke, died May 8th.
Shubael Conant.
A. D. Fraser, appointed to fill vacancy.

1856.

Edmund A. Brush, President.
Shubael Conant.
Wm. R. Noyes.
Alexander D. Fraser, re-appointed May 1st, for 5 years.
Henry Ledyard.

1857.

Edmund A. Brush, President, re-appointed May 1st, for 5 years.
Henry Ledyard.
Alexander D. Fraser.
Wm. R. Noyes.
Shubael Conant.

1858.

Edmund A. Brush, President.
Shubael Conant.
Alexander D. Fraser.
Henry Ledyard, re-appointed May 1st, for 5 years.
Wm. R. Noyes.

1859.

Edmund A. Brush, President.
Alexander D. Fraser.
Wm. R. Noyes.
Shubael Conant, term expired May 1st, and
Julius D. Morton, appointed for 5 years.
Henry Ledyard, vacated by moval from city, and
John V. Ruehle, appointed May 1st to fill vacancy.

1860.

Edmund A. Brush, President.
Alexander D. Fraser.
Julius D. Morton.
William R. Noyes, re-appointed May 1st, for 5 years.
John V. Ruehle.

1861.

Edmund A. Brush, President.
Alexander D. Fraser, re-appointed May 1st for 5 years.
Jno. V. Ruehle, resigned Sept. 16th, and
Chauncey Hurlbut appointed to fill vacancy.

1862.

Edmund A. Brush, President, re-appointed May 1st, for 5 years.
Wm. R. Noyes.
Julius D. Morton.
Chauncey Hulrbut.
Alexander D. Frazer.

1863.

Edmund A. Brush, President.
Alexander D. Fraser.
Mm. R. Noyes.
Julius D. Morton.
Chauncey Hurlbut, term expired May 1st, and
Stanley G. Wight, appointed for 5 years.

1864.

Edmund A. Brush, President.
Alexander D. Fraser.
Wm. R. Noyes.
Julius D. Morton, term expired May 1st.
Stanley G. Wight.

1865.

Edmund A. Brush, President.
Wm. R. Noyes, resigned Jan. 10, and Jacob S. Farrand appointed to fill vacancy, Term expired May 1st. Re-appointed for 5 years.
Alexander D. Fraser.
Stanley G. Wight.
Julius D. Morton, Re-appointed for 5 years from May 1st, 1864. Died Feb. 1865, and
Jno. Owen appointed to fill vacancy.

1866.

Edmund A. Brush, President.
Alexander D. Fraser, re-appointed May 1, for 5 years.
Stanley G. Wight.
Jacob S. Farrand.
Jno. Owen.

1867.

Edmund A. Brush, President, re-appointed May 1, for 5 years.
Alexander D. Fraser.
Jacob S. Farrand.
Jno. Owen.
Stanley G. Wight.

1868.

*Edmund A. Brush, President.
Stanley G. Wight, term expired May 1, and
Chauncey Hurlbut appointed for 5 years.
Jacob S. Farrand.
John Owen.
Caleb Van Husan.

*Edmund A. Brush resigned January 28, and Caleb Van Husan appointed to fill vacancy, and Alexander D. Fraser elected President.

1869.

Alexander D. Fraser, President.
John Owen, re-appointed May 1, for 5 years.
Jacob S. Farrand.
Caleb Van Husan.
Chauncey Hurlbut.

1870.

Alex. D. Fraser, President.
Jacob S. Farrand, re-appointed May 1, for 5 years.
Jno. Owen.
Caleb Van Husan.
Chauncey Hurlbut.

1871.

*Alex. D. Fraser, President.
Jacob S. Farrand.
Caleb Van Husan.
Chauncey Hurlbut.
John Owen.

*Term expired May 1, and Samuel F. Hodge appointed for 5 years. Jacob S. Farrand elected President.

1872.

Jacob S. Farrand, President.
Jno. Owen.
*Caleb Van Husan.
Samuel F. Hodge.
Chauncey Hurlbut.

*Term expired May 1st, and Elija Smith appointed for 5 years.

1873.

*Chauncey Hurlbut, President.
Jno. Owen.
Jacob S. Farrand.
Samuel F. Hodge.
Elija Smith.

*Term expired and re-appointed. Elected President, May, 1872.

1874.

Chauncey Hurlbut, President. Jacob S. Farrand.
*Jno. Owen. Samuel F. Hodge.
Elija Smith.

*Term expired and re-appointed.

1875.

Chauncey Hurlbut, President. *Jacob S. Farrand.
John Owen. Samuel F. Hodge.
Elija Smith.

*Term expired and re-appointed.

1876.

Chauncey Hurlbut, President. Jacob S. Farrand.
John Owen. *Samuel F. Hodge.
Elija Smith.

*Term expired and re-appointed.

1877.

Chauncey Hurlbut, President. Jacob S. Farrand.
John Owen. Samuel F. Hodge.
*Michael Martz.

*Elija Smith's term expired and Michael Martz appointed to fill vacancy.

1878.

*Chauncey Hurlbut, President. Jacob S. Farrand.
John Owen. Samuel F. Hodge.
Michael Martz.

*Term expired and re-appointed.

1879.

Chauncey Hurlbut, President. Jacob S. Farrand.
Michael Martz. *Jas. Beatty.
*Jno. Pridgeon.

*Jno. Owen's term expired and John Pridgeon appointed to fill vacancy. Samuel F. Hodge resigned and Jas. Beatty appointed to fill vacancy.

1880.

Chauncey Hurlbut, President. *Jacob S. Farrand.
Michael Martz. Jas. Beatty.
Jno. Pridgeon.

*Term expired and re-appointed.

1881.

Chauncey Hurlbut, President. Jacob S. Farrand.
Michael Martz. *Jas. Beatty.
Jno. Pridgeon.

*Term expired and re-appointed.

1882.

Chauncey Hurlbut, President. Jacob S. Farrand.
*Michael Martz. Jas. Beatty.
Jno. Pridgeon.

*Term expired and re-appointed.

1883.

*Chauncey Hurlbut, President. Jacob S. Farrand.
Michael Martz. Jas. Beatty.
Jno. Pridgeon.

*Term expired and re-appointed.

1884.

Chauncey Hurlbut, President. Jacob S. Farrand.
Michael Martz. Jas. Beatty.
*Jno. Pridgeon.

*Term expired, and Marshall H. Godfrey appointed.

1885.

*Jacob S. Farrand, President. Michael Martz.
Marshall H. Godfrey. *Edwin F. Conely.
*Samuel G. Caskey.

*Jas. Beatty died and Edwin F. Conely appointed to fill vacancy.
*Chauncey Hurlbut died and Samuel G. Caskey appointed to fill vacancy.
*Jacob S. Farrand's term expired and re-appointed.

1886.

Jacob S. Farrand, President. Michael Martz.
Marshall H. Godfrey. *Jno. Pridgeon.
Samuel G. Caskey.

*Edwin F. Conely's term expired and Jno. Pridgeon appointed to fill vacancy.

1887.

Jacob S. Farrand, President. Jno. Pridgeon.
Marshall H. Godfrey. Samuel G. Caskey.
*Joseph Nagel.

*Michael Martz' term expired and Joseph Nagel appointed to fill vacancy.

1888.

Jacob S. Farrand, President. Jno. Pridgeon.
Marshall H. Godfrey. *Samuel G. Caskey.
Joseph Nagel.

*Term expired and re-appointed.

1889.

Jacob S. Farrand, President. Jno. Pridgeon.
Samuel G. Caskey. Jos. Nagel.
*August Goebel.

*Marshall H. Godfrey resigned January 1, 1889. August Goebel appointed to fill vacancy. Term expired May 1st, and re-appointed.

1890.

Jno. Pridgeon, President. August Geobel.
Joseph Nagel. *Henry M. Duffield.
Samuel G. Caskey.

*Jacob S. Farrand's term expired, and Col. Duffield was appointed to fill vacancy July 9th, 1890; John Pridgeon resigned as President of the Board, on account of ill-health, and Henry M. Duffield was elected to fill vacancy.

1891.

Henry M. Duffield, President. *Jno. Pridgeon.
August Goebel. Samuel G. Caskey.
Joseph L. Hudson.

*John Pridgeon's term expired May 1st, and Frank E. Kirby was appointed for a term of 5 years.

1892.

Samuel G. Caskey, President.
Henry M. Duffield.
August Goebel.
Joseph L. Hudson.
Frank E. Kirby.

1893.

August Goebel, President.
Samuel G. Caskey.
Frank E. Kirby.
Henry M. Duffield.
Joseph L. Hudson.

1894.

Henry M. Duffield, President.
Frank E. Kirby.
Albert L. Stephens.
De Witt H. Moreland.
Edward W. Pendleton.

A. L. Stephens appointed to succeed J. L. Hudson.
D. W. H. Moreland appointed to succeed S. G. Caskey.
Clarence A. Black appointed to succeed August Goebel.
C. A. Black resigned and E. W. Pendleton appointed to succeed him from Dec. 1.

1895.

Frank E. Kirby, President.
Albert L. Stephens.
De Witt H. Moreland.
Edward W. Pendleton.
Darius D. Thorp.

1896.

Albert L. Stephens, President.
John P. Huckestein.
Edward W. Pendleton.
Darius D. Thorp.
John W. McGrath.

D. W. H. Moreland resigned to accept Commissionership on Board of Public Works, and J. P. Huckestein was appointed to fill vacancy.

Frank E. Kirby's term expired and J. W. McGrath was appointed to succeed him.

1897.

Edward W. Pendleton, President. James W. Millen.
Darius D. Thorp. John W. McGrath.
August Goebel.

August Goebel, appointed to succeed A. L. Stephens. Resigned January 1, 1898 and Joseph J. Noeker was appointed to fill vacancy.

John P. Huckestein resigned and James W. Millen was appointed to fill vacancy.

1898.

Edward W. Pendleton, President. John W. McGrath.
Joseph J. Noeker. Darius D. Thorp.
James Meathe.

1899.

Darius D. Thorp, President. Joseph J. Noeker.
John W. McGrath. *James Meathe.
Edward W. Pendleton.

*James Meathe died September 21st, 1899, and Benjamin Guiney was appointed to fill vacancy.

1900.

John W. McGrath, President. *Benjamin Guiney.
Joseph J. Noeker. Edward W. Pendleton.
Darius D. Thorp.

*Benjamin Guiney resigned, and John Zynda was appointed to fill vacancy.

1901.

Joseph J. Noeker, President. Edward W. Pendleton.
John Zynda. Darius D. Thorp.
Joseph J. Crowley.

1902.

John Zynda, President. Edward W. Pendleton.
Darius D. Thorp. Joseph J. Crowley.
John Schroeder.

1903.

Edward W. Pendleton, President.
Darius D. Thorp.
Joseph J. Crowley.
John Schroeder.
John Zynda.

1904.

Darius D. Thorp, President.
Joseph J. Crowley.
John Schroeder.
John Zynda.
Edward W. Pendleton.

1905.

Joseph J. Crowley, President.
John Zynda.
John Schroeder.
Edward W. Pendleton.
John F. Dodge.

1906.

John Schroeder, President.
Edward W. Pendleton.
John Zynda.
John F. Dodge.
Frederick J. Clippert.

1907.

John Zynda, President.
John F. Dodge.
Edward W. Pendleton.
Frederick J. Clippert.
James H. Pound.

1908.

Edward W. Pendleton, President.
John F. Dodge.
James H. Pound.
Frederick J. Clippert.
Basil A. Lemke.

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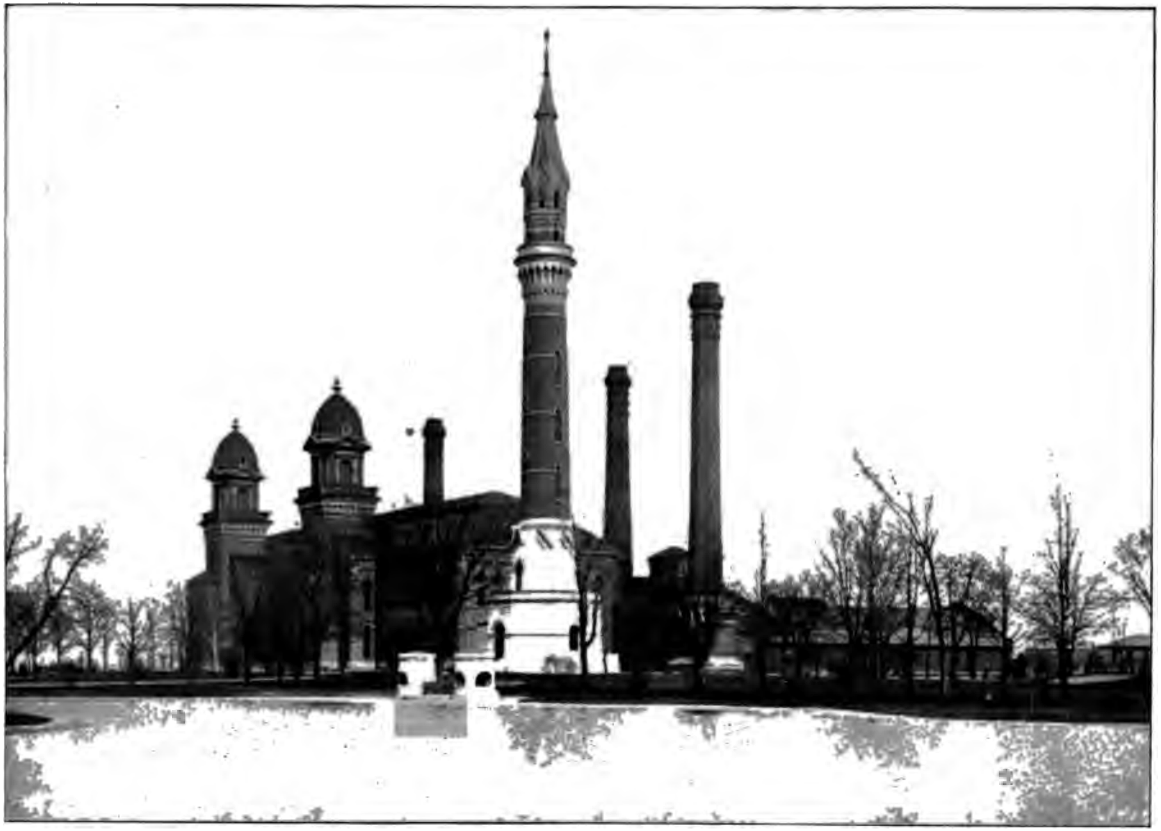
FIFTY-SEVENTH
ANNUAL REPORT
OF THE
BOARD OF WATER COMMISSIONERS

WATER WORKS

TO THE

COMMON COUNCIL OF THE CITY OF DETROIT

FOR YEAR
ENDING JUNE 30TH
1909



1909

FIFTY-SEVENTH ANNUAL REPORT

OF THE

etroit Board of Water Commissioners

OF THE CITY OF DETROIT

TO THE

Common Council of the City of Detroit

TOGETHER WITH THE

Reports of the Officers of the Board

For Year Ending June 30th, 1909

THOS. SMITH PRESS
DETROIT

CONTENTS.

Page

Report of the Commissioners.. 7

Financial Report of the Secretary........................ 11

Report of the General Manager.... 29

Report of the Civil Engineer... 31

Summary of Statistics......... 79

Report of Superintendent of Meters and Inspection.............. 84

Report of the Chief Engineer at Pumping Works 89

Roll of Commissioners 91

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BOARD OF WATER COMMISSIONERS
OF THE
CITY OF DETROIT

MEMBERS:

JOHN F. DODGE, 1910
JAMES H. POUND, 1912
FREDERICK J. CLIPPERT, 1911
BASIL A. LEMKE, 1913
JAMES WILKIE, 1914

COMMITTEES:

WAYS AND MEANS	Commissioners LEMKE, POUND
EXTENSION AND CONSTRUCTION	Commissioners POUND, CLIPPERT
PUMPING WORKS	Commissioners CLIPPERT, WILKIE
SUPPLIES	Commissioners WILKIE, LEMKE

The President is ex-officio member of each committee.

OFFICERS:

PRESIDENT,	JOHN F. DODGE
VICE PRESIDENT,	FREDERICK J. CLIPPERT
GENERAL MANAGER	H. S STARKEY
SECRETARY,	BENJ. F. GUINEY
CIVIL ENGINEER	GEORGE H. FENKELL
SUPT OF METERS AND INSPECTION	THOMAS R. PUTNAM
CHIEF ENGINEER AT PUMPING WORKS,	URIAH GOULD
BOOKKEEPER,	W. W WILCOX
RECEIVING CLERK,	GEORGE E. KUNZE
CASHIERS,	D. C. GROBBEL CHARLES W. KEENA
METER CLERKS,	W. W. COONEY CHAS. F. GILMER
PERMIT CLERK,	GEO. BARRIE
ASSESSORS,	FRANK PETZ ALBERT L STADLER ANTHONY VOGEL OSCAR A. RIOPELLE WM. COSGROVE JOHN W. PALMER M. A. DETTLING THOMAS J. CLANCY JOHN C. BECKER GEO. P. MOOG

THE BOARD OF WATER COMMISSIONERS

OF THE

CITY OF DETROIT

Rates adopted June 15th, 1909

FROM JULY 1ST, 1909.

Payable Quarterly	Quarterly
First 30,000 gallons	$1 75
All in excess of 30,000 gallons	3 cts. per M.
Minimum rate	1 75

ASSESSMENT RATES

	Per Annum
For Family, household purposes, each family	$3 20
Greenhouses—Special rates.	
Private Stable, for each horse	1 20
Livery Stable, for each horse	1.20
Dray and Team Horses, each	1 00
Cows, each	1.00
Stores and Offices, from	$1 00 to 12 00
Bakeries, average daily use for each bbl. of flour	2 00
Groceries and Provision Stores, from	3 00 to 50 00
Saloons, from	6 00 to 50 00
Bar, with faucet, from	8 00 to 50 00
Fish Houses, from	6 00 to 50 00
Beer Pump	2 00
Barber Shops, each chair	2 00
Slaughter-houses—Special Rates.	
Hotels and Taverns, in addition to family rate, each room	60
Boarding Schools, from	$4 00 to 50 00
Printing Offices—Special Rates.	
Butcher Stalls, each not less than	3 00
Work Shops, for 10 persons or under	3 00
Work Shops, for each additional 10 persons	3 00
Boarding Houses, in addition to family rate, each boarder or roomer	40
Estimated quantities of water, each 1,000 gallons	07
Building Purposes, each 1 M. brick	03
" " each 100 yards plastering	05
" " each perch stone	01
" " minimum	50
Automobiles, each	1 20

FIXTURES

Bath Tub, for families, each	1 00
" public, each tub	4 00
Automatic Water Closets, for family, 1st closet	1 60
" " " each additional	60
" " " for hotels, stores, factories, etc., for 10 persons	2 00
" " " each additional person	20
Rod Water Closets, not less than	6 00
Urinals, not less than	2 00
Wash Hand Basin, for family, each	48
" " " for other purposes, each person	15
Hose Bibb or connection, Premises 30 feet front or less	1 00
" " " " 30 feet to 60 feet	1 40
" " " " 60 feet to 100 feet	2 00
Special Rates for larger grounds.	
Fountains	$10 00 to 20 00
Street Sprinklers, each wagon	50 00

Where there is a waste of water an increase of rates will be made.

ANNUAL REPORT
OF THE
BOARD OF WATER COMMISSIONERS
OF THE
CITY OF DETROIT
JULY 1, 1908 TO JUNE 30, 1909.

TO THE HONORABLE
The Common Council of the City of Detroit.

GENTLEMEN:—In order to keep pace with the growth of this city, and to furnish an abundance of water, at reasonable pressures, for domestic consumption, manufacturing purposes and fire protection, a greater amount of construction work has been done, than in any twelve consecutive months since the works were first put in operation.

A new 48 inch main has been laid from the pumping station to Chene Street in Jay Street, and as this main is now being constructed still further westward, it is expected within the next few months to make connections at Orleans Street and Gratiot Avenue, thereby insuring for the low service district an adequate supply at all seasons. The 42 inch main in Jefferson Avenue West was extended from Artillery Avenue to Solvay Street, and much other work of a large and expensive nature has been completed.

Work has been started on a 48 inch main for the northern portion of the city; and details of this work and the other operations of the Board are explained in detail in the reports of the heads of the various departments, which are hereto attached.

An earnest endeavor has been made to meet the requirements of the Fire Department, and to this end 8.3 miles of pipe have been laid for fire protection, at a total cost of $76,872.72.

The consumption of water has reached a daily average per capita in Detroit of 168.4 gallons. During the past year the population of Detroit has increased 3.29 per centum, while the consumption of water has increased 3.84 per centum.

The plans for the new pumping station have been approved, and the officers of the Board have been directed to proceed with the construction of the foundations. Specifications for three 30-million gallon pumping engines have been prepared and proposals for the same will be received within the next few months.

The amount of free water furnished by the Board amounts to 7.2 per centum of the total pumpage, as determined by actual meter readings and careful estimates. This is equivalent, during the year, to the entire pumpage for 26 average days.

The Board believes that the water supplied through its mains is wholesome and of excellent quality, and that the few local outbreaks of typhoid fever in the city and suburbs are due to some other cause than infection of the water supply.

The emergency station has been in service continuously, and the large air chamber, which is connected to two 42 inch force mains, has been in constant operation. That no breaks in mains of a serious nature have occurred during the year would indicate that this station has had a very beneficial effect upon pressures.

There are now in operation 7,956 meters, which is 9.2 per centum of the total number of service connections. All manufacturing plants and large users of water are metered, and 634 meters were set during the past year.

The large number of sanitary drinking fountains which have been set, or have been petitioned for, is sufficient evidence of their appreciation by the public.

The total receipts for the year are $1,107,001.63, as follows: from rates, $628,177.65; bonds and loans, $300,000.00; miscellaneous, $76,341.96; general tax levy, $75,000.00; village extensions, $27,482.02.

The total expenditures are $1,154,529.77, as follows: operation and maintenance, $182,163.74; construction, $821,402.70; Hurlbut fund, $4,688.77; bonds, $85,000.00; interest, $37,273.50; real estate, $24,001.06.

In order to provide funds for the completion of the improvements now being made, and to maintain the system in a high standard of condition, an increase in rates will be put in effect July 1, 1909. An endeavor has been made to make these rates equitable, and it is believed that Detroit will still have the lowest rates of any city in the United States whose water is supplied by pumping.

It has been and will be the purpose and intention of this Board to conduct its affairs in an impartial and economical manner.

Respectfully submitted,

JNO. F. DODGE,
F. J. CLIPPERT,
JAMES H. POUND,
BASIL A. LEMKE,
JAS. WILKIE.

The Board of Water Commissioners of the City of Detroit.

REPORT OF THE SECRETARY

DETROIT, MICH., JULY 1ST, 1909.

To the Honorable, The Board of Water Commissioners, of the City of Detroit:

GENTLEMEN:—I herewith respectfully submit my report as Secretary of the receipts and disbursements of this department for the year ending June 30th, 1909.

The receipts include $39,270.02 received for water manis installed in the Villages of Highland Park, Ecorse, Hamtramck and River Rouge and from the Michigan Central Railroad Company for supply mains in Artillery and Dix Avenues.

By resolution of the Board, for the purpose of paying the balance due on the Edwards land contract and under advice of the Corporation Counsel as to its legality, the sum of $20,000.00 was borrowed from the Sinking Fund and a promissory interest-bearing note issued therefor, thereby effecting a saving of 2½% per annum.

Respectfully submitted,
BENJ. F. GUINEY,
Secretary.

Receipts

Water rates assessed	$398,220 75	
Water rates metered	229,956 90	$628,177 65
Percentage		7,753 39
Shutting off and letting on		442 00
Service cocks, permits	10,523 00	
Service cocks, labor and material	4,253 00	14,776 00
Service extensions		105 68
Plumbers' license		655 25

City of Detroit		75,000 00
Real estate revenue and expense		1,350 00
Meter, labor and material		860 70
Meter repairs and expenses, labor and material		9 50
Pumping water, material		83 48
Pumping works, material		106 47
Repairing leaks, labor and material		3 44
Office		146 73
Iron pipe, material and labor, including subway work	20,691 82	
Bonuses	4,486 71	25,178 53
Village of Highland Park, estimates laying pipe		16,304 49
Village of Ecorse, estimates laying pipe		500 53
Village of Hamtramck, estimates laying pipe.		870 00
Village of River Rouge, estimates laying pipe.		9,807 00
Michigan Central R. R. Co., estimate laying pipe Artillery Ave. to Dix		11,788 00
Loan Account		50,000 00
Bonded indebtedness		250,000 00
Interest on General Fund	1,877 85	
Interest on Sinking Fund	6,601 46	
Interest on Hurlbut Fund	17 42	8,496 73
Hurlbut Fund from Trustees		4,586 06
Total receipts		$1,107,001 63

Disbursements.

Office (Operation)—	
General manager, secretary and clerks	$ 28,805 83
Watchman and janitor	2,169 75
General work and carpenter	1,564 62
Books, printing and stationery	1,995 96
Telephone rental	291 90
Advertising and subscription	213 61
Stamped envelopes and postage	418 04
Towel supply	82 50
Street car tickets	15 00
Ice	48 83
Coal	265 80
Bond premiums	91 50
Gas	10 96
Still alarm	67 50
Horse shoeing	17 50

Horse care	165 00	
Miscellaneous	45 13	
		$ 36,269 43

Service Connections and Leaks (Operation)—

Superintendent inspection and labor	$ 15,285 64	
Service cocks, sleeves and valves	2,021 53	
Tools and repairs	330 51	
Pipe and Fittings	35 78	
Telephone rental	40 00	
Car tickets	195 00	
Printing	76 00	
Freight and express	4 52	
Miscellaneous	4 00	
		$ 17,992 98

Pumping Water (Operation)—

Engineers, firemen, coal passers	$ 41,313 83	
Coal	39,984 65	
Unloading coal	3,991 19	
Boiler and engine supplies and repairs	1,666 03	
Engine oil and grease	872 07	
Waste, packing and rags	436 74	
Boiler inspection and insurance premium.	234 00	
Tools, fittings and repairs	353 93	
Telephone rental	45 00	
Paint, oil and glass	172 17	
Printing and stationery	4 55	
Ice	63 30	
Towel supply	60 63	
Horse shoeing and harness	40 30	
Horse feed and bedding	40 68	
Adertising	55 56	
Lumber	6 19	
Freight and express	3 96	
Rubber boots	9 82	
Car tickets	2 00	
Electric fixtures, etc.	48 12	
Doctors services	50 00	
Miscellaneous	172 10	
		$ 89,626 82

Repairing Leaks (Operation)—

Superintendent, clerk and labor	$ 1,644 07	
Phone rental	15 00	
Rubber boots	9 82	

Printing	4 00	
		$ 1,672 89
Meter Repairs and Expense (Operation)—		
Superintendent and labor	$ 1,910 00	
Fittings	1,885 38	
Printing	5 90	
		$ 3,801 28
Percentage—		
Superintendent and labor	$ 6,850 00	
		$ 6,850 00
Inspection—		
Superintendent and inspectors	$ 8.049 71	
Car tickets	230 00	
Printing	21 75	
Electric lamps	34 20	
		$ 8,335 66
Wagon and Harness—		
Harness and repairs	$ 493 91	
Trucks, wagons and repairs	1,648 76	
Advertising	58 61	
		$ 2,201 28
Office Furniture and Fixtures—		
Furniture and fixtures	$ 39 79	
Electric fixtures and repairs	48 18	
Fittings, hardware, etc.	2 05	
		$ 90 02
Real Estate, Revenue, and Expense—		
Foreman, labor	$ 229 98	
Scale repairs	14 55	
Toilet room, engineer's department, fittings, etc.	161 57	
Insurance premiums	96 80	
Removing obstruction, Detroit River Old Pumping Station	600 00	
Paint, oil and glass	105 41	
Wiring, storage yard	548 27	
Lumber	50 05	
Wiring office	113 99	
Repairing roof, storage yard houses, office.	136 00	
Boiler inspection	1 50	
Vinton Co., emergency station cont., final	10 00	

Sand stone, etc.	31 42	
Smith, Hinchman & Grylls, architects' estimate	146 02	
Installing underground cable, storage yard	194 00	
		$ 2,439 56
Real Estate—		
Interest on land contract, John Edwards Est.	$ 1,750 00	
Payment, land cont., John Edwards Est..	20,000 00	
Purchase lot, T. & D. Fritz	2,250 00	
Recording deed	1 06	
		$24,001 06
Horse Expense, Service Connections (Operation)—		
Oats, hay and bedding	$ 1,227 82	
Shoeing	200 89	
Doctor expenses, drugs	42 87	
Horse care	135 00	
		$ 1,606 58
Horse Expense, Repairing Leaks—		
Oats, hay and bedding	$ 1,228 63	
Shoeing	205 51	
Horse Care	135 00	
Doctor services and drugs	30 38	
		$ 1,599 52
Pumping Works, Grounds Only (Operation)—		
Pay rolls, superintendent and labor	$ 8,474 39	
Phone rental	21 00	
Tools and fittings	221 09	
Sand, gravel and lumber	399 28	
Hose and couplings	34 06	
Paint, oil and glass	89 45	
Horse shoeing	35 40	
Roof repairs, library and engineer's house	76 70	
Pots, flowers, seed, etc	81 28	
Printing and stationery	3 17	
Car tickets	4 00	
Ice	52 20	
Miscellaneous	105 29	
		$ 9,597 31

Plumbers' License—		
Printing	$ 7 50	
		$ 7 50
Interest—Loan Account—		
Interest	$ 72 91	
		$ 72 91
Iron Pipe (Construction)—		
Superintendent nad clerks	$ 7,941 94	
Foremen	6,934 66	
Watchmen, teamsters and bricklayers	27,045 28	
Laborers	236,956 10	
Iron pipe	271,439 99	
Special castings	41,937 40	
Gates, valves and hydrants	30,215 43	
Pig lead	21,972 38	
Lead pipe and solder	562 30	
Sand, brick, cement and stone	7,929 39	
Lumber	5.385 33	
Coal	1,123 14	
Tools	2,764 67	
Repairing tools	367 15	
Lanterns, globes, nails and fittings	1,988 23	
Iron beams	779 19	
Cartage	9,767 02	
Car tickets	225 00	
Telephone rental	249 03	
Books, printing and stationery	522 30	
Hose and couplings	321 23	
Inspection and repaving	8,907 70	
Rubber boots and repairs	134 75	
Paving blocks	117 63	
Packing, waste, rope and rags	647 00	
Oil and gasoline	436 40	
Paint and glass	105 54	
Advertising	178 28	
Still alarm	67 50	
Inspection, pipe acct., Birmingham, Ala.	907 90	
Inspection, gate acct., Elmira, N. Y.	553 65	
Freight, express and telegrams	42,946 43	
Venturi meter	1,930 20	

Iron braces and fittings	675 00	
Physician and hospital services	383 32	
Towel supply	27 50	
Pumps, fittings and diaphragms	569 42	
Dixie Blowers	177 00	
Electric trucks, fittings and repairs	663 01	
Automobile repairs and fixtures	680 03	
Siding Repairs, right of way	401 38	
Drinking fountains and fixtures	1,176 87	
Burroughs adding machine and typewriter	575 50	
Ice	15 51	
Geo. H. Fenkell, et al., expense ac., Cleveland	68 15	
Electric motor, blacksmith shop	139 12	
Miscellaneous	540 80	
		$739,452 75
Horse Expense, Iron Pipe—(Construction)—		
Oats, hay and bedding	$ 2,460 35	
Shoeing	409 45	
Purchase of horses	975 00	
Doctors' services and drugs	56 40	
		$ 3,901 20
Meter Construction—		
Superintendent, foremen and laborers	$ 5,326 59	
Meters	8,178 21	
Special castings and fittings	663 17	
Telephone rental	74 50	
Printing and stationery	11 75	
Lumber	55 67	
Packing and rags	11.59	
Gasoline	4 00	
Horse shoeing	62 00	
Tools and repairs	60 93	
Bicycle repairs	28 70	
Horse and wagon repairs	62 80	
Express and freight	67 32	
Oil and tallow	3 43	
Meter boxes	35 75	
Miscellaneous	6 62	
		$14,653 03

Engineering—		
Civil engineer and assistants	$ 20,304 12	
Tracing cloth and paper	249 89	
Printing, stationery and maps	332 93	
Street car tickets	245 00	
Telephone rental	72 00	
Instruments, tools and fittings	154 95	
Postage	25 00	
Camera supplies	49 99	
Paint and oil	8 65	
Express and freight	22 84	
Subscription and books	27 90	
Electric power and fixtures	41 25	
Towel supply	2 75	
Miscellaneous	80 77	
		$21,618 04
Pumping Works (Construction)—		
Foremen and laborers	$ 3,399 59	
Painting wood and iron work, Pumping Station	866 00	
Iron rails and bolts	156 40	
Furnace repairs	898 04	
Repairing toilet rooms, marble, etc	268 75	
Payments, coal shed, J. H. Haberkorn	11,098 00	
Barn contract, John Finn	12,500 00	
Architects, estimates	8,595 38	
Iron and steel work, H. B. Lewis	2,330 00	
Marble and tile work stables and plumbing and wiring	1,526 49	
Advertising	101 03	
Plastering chief engineer's house	38 00	
		$41,777 68
Hurlbut Fund (Independent)—		
Library and assistants, superintendent and labor	$ 4,678 55	
Furniture and fixtures	2 00	
Subscription	8 22	
		$ 4,688 77
Bonded Indebtedness—		
Bonds redeemed	$ 10,000 00	
		$10,000 00

Interest—		
Coupons	$ 37,098 50	
Advertising	175 00	
		$37,273 50

Bond Account—		
Bonds	$ 75,000 00	
		$75,000 00

RECAPITULATION OF EXPENDITURES, FOR OPERATION, MAINTENANCE, CONSTRUCTION AND INDEPENDENT.

For Operation and Maintenance—		
Office	$ 36,269 43	
Service connections and leaks	17,992 98	
Pumping water	89,626 82	
Repairing leaks	1,672 89	
Meter repairs and expenses	3 801 28	
Percentage	6 850 00	
Inspection	8.335 66	
Wagon and harness	2,201.28	
Office furniture and fixtures	90 02	
Real estate revenue and expenses	2,439 56	
Horse expense, service connections	1,606 58	
Horse expense, repairing leaks	1.599 52	
Pumping works, grounds only	9,597 31	
Plumbers' license	7 50	
Interest, loan account	72 91	
		$182,163 74

For Construction—		
Iron pipe	$739,452 75	
Iron pipe, horse expense	3,901 20	
Meter	14,653 03	
Engineering	21,618 04	
Pumping works	41,777 68	
		$821,402 70

For Independent—		
Hurlbut Fund	$ 4,688 77	
Bonded indebtedness	10,000 00	
Interest	37,273 50	

Bond account	75,000 00	
Real estate	24,001 06	
		$150,963 33
Total		$1,154,529 77

RECAPITULATION OF EXPENDITURES.

Total Operation	$182,163 74	
Total Construction	821,402 70	
Total Independent	150,963 33	
		$1,154,529 77

RECAPITULATION OF EXPENDITURES.

July 1st, 1908, to June 30th, 1909.

1908.		
July	$122,944 99	
August	75,242 29	
September	94,210 55	
October	67,073 70	
November	88,005 81	
December	116,552 59	
1909.		
January	150,656 75	
February	94,027 46	
March	72,101 18	
April	95,944 11	
May	101,898 40	
June	75,871 94	
		$1,154,529 77

TOTAL RECEIPTS FROM JULY 1st, 1908, TO JUNE 30, 1909.

1908.	
July	$154,840 65
August	177,613 54
September	28,917 72
October	154,116 90
November	23,824 51
December	30,305 92

1909.		
January	204,359 88	
February	15,731 42	
March	23,846 82	
April	117,251 04	
May	94,349 63	
June	81,843 60	
	$1,107,001 63	
Cash on hand June 30th, 1908	4,015 14	
Total	$1,111,016 77	

With bank deposits as follows:

1908.		
July	$151,113 21	
August	183,691 70	
September	24,830 68	
October	152,514 46	
November	28,926 15	
December	27,798 55	
1909.		
January	202,176 38	
February	20,910 78	
March	20,962 53	
April	112,620 23	
May	101,937 76	
June	80,136 19	
	$1,107,618 62	
Total cash on hand June 30, 1909	3,398 15	
		$1,111,016 77

CASH STATEMENT FOR YEAR ENDING JUNE 30th, 1909.

		Dr.	
Cash on hand June 30th, 1908		$ 4,015 14	
Cash in bank—			
General Fund	$ 4,128 13		
Sinking Fund	63,582 89		
Hurlbut Fund	153 82		
Secretary Fund	1,000 00		
		$ 68,864 84	
Total receipts		1,107,001 63	
			$1,179,881 61
		Cr.	
Cash on hand June 30, 1909		$ 3,398 15	
Cash in bank—			
General Fund	$ 17,974 31		
Sinking Fund	2,910 85		
Hurlbut Fund	68 53		
Secretary Fund	1,000 00		
		$ 21,953 69	
Total disbursements		1,154,529 77	
			$1,179,881 61

THE AMERICAN EXCHANGE NATIONAL BANK.

DETROIT, JULY 1ST, 1909.

Benj. F. Guiney, Secretary, Board of Water Commissioners of the City of Detroit.

DEAR SIR:—This is to certify that the amounts of balances in this bank to the credit of the Board of Water Commissioners of the City of Detroit, at the close of business June 30th, 1909 were as follows: General Fund, $17,974.31; Sinking Fund, $2,910.85; Hurlbut Fund, $68.53; Secretary Fund, $1,000.00.

Yours truly,
CHAS. S. HOWARD,
Auditor.

WADING BEACH

Assessments, 1909-1910.

Dist.	Wards	Families				Increase	Vacant Tenements	Assessments		
		Supplied by Meter	Assessed	Not Supplied	Whole Number			1909-1910	Increase	Trans-f'r'd to Meter Rolls
A1	Seventeenth	426	7031	19	7476	944	68	$44,560 74	$11,435 74	$173 76
10	Ninth	750	6595	3	7348	99	68	28,043 38	5704 52	184 37
	Fift'nth	552	3471	2	4025	310	32	22,374 13	4,911 13	236 64
	Total	1302	10066	5	11373	409	100	50,417 51	10,615 65	42101
2	Elev'nth	421	4683	....	5104	93	58	22,793 88	4205 30	340 72
	Thirteenth	513	4897	1	5411	232	73	26,218 72	5572 74	205 52
	Total	934	9580	1	10515	325	131	49 012 60	9778 04	546 24
3	First	1460	3823	....	5283	283	123	29,898 08	4,977 74	202 34
	Seventh	489	3600	5	4094	—83	97	16,468 86	3,229 84	151 12
	Total	1949	7423	5	9377	200	220	46,366 94	8,207 58	353 46
4	Third	840	4233	3	5076	78	82	24,475 78	4,613 56	265 52
	Fifth	690	4977	3	5670	47	93	24,993 96	5,100 28	149 44
	Total	1530	9210	6	10746	125	175	49,469 74	9,713 84	414 96
5	Second	1495	2317	1	3813	315	31	21,144 02	2,497 68	166 64
	Sixth	882	4057	7	4946	26	73	23,674 72	3,680 34	78 55
	Total	2377	6374	8	8759	341	104	44,818 74	6,178 02	245 19
6	Tenth	820	5202	....	6022	213	98	30,794 93	6,235 71	202 48
	Fourteenth	375	4184	12	4571	108	110	24,133 53	5,190 95	147 04
	Total	1195	9386	12	10593	321	208	54,928 46	11,426 66	349 52
7	Fourth	1031	4055	5	5091	286	63	28,727 62	5,807 30	161 44
	Twelfth	349	4897	....	5246	212	93	26,924 76	5,639 98	135 24
	Total	1380	8952	5	10337	498	156	55,652 38	11,447 28	296 68
8	Eighth	686	4607	....	5293	177	46	27,685 90	4,881 18	269 44
	Sixt'nth	399	6836	12	7247	228	59	34,638 84	7,690 20	157 44
	Total	1085	11443	12	12540	405	105	62,324 74	12,571 38	426 88
9	Eighteenth	146	4406	211	4763	214	155	22,032 94	5 301 34	360 16
	Grand Total	12324	83871	284	96479	3782	1422	479,584 79	96,765 53	3,587 86

Receipts of Water Rates by Districts.

From July 1, 1908 to July 1, 1909.

YEARS	First District Wards 9, 15 and 17	Second District Wards 11 and 13	Third District Wards 1 and 7	Fourth District Wards 3 and 5	Fifth District Wards 2 and 6	Sixth District Wards 10 and 14	Seventh District Wards 4 and 12	Eight District Wards 8 and 16	Ninth District Ward 18	METERS	Total
1896-97	....	....	4 00	....	....	....	....	....	....	....	4 00
1898-99	....	....	....	....	1 50	....	....	....	....	....	1 50
1899-1900	....	....	....	....	2 70	....	....	....	....	....	2 70
1902-03	....	....	1 50	....	....	....	1 80	....	....	....	3 30
1903-04	....	....	1 50	....	1 80	5 60	2 00	....	....	....	10 90
1904-05	5 60	....	....	....	....	5 60	....	....	....	....	11 20
1905-06	....	....	....	....	....	1 62	4 00	....	....	....	5 62
1906-07	10 56	....	3 61	....	5 50	4 02	4 74	4 43	8 10	....	40 96
1907-08	1,742 25	492 86	1,023 03	1,031 83	1,086 88	1,278 85	1,118 81	1,238 01	833 29	....	9,845 81
1908-09	75,798 39	39,645 67	38,388 94	39,681 86	38,425 54	44,497 05	45,328 69	49,613 93	16,914 69	229,956 90	618,251 66
Total	77,556 80	40,138 53	39,422 58	40,713 69	39,523 92	45,792 71	46,460 04	50,856 37	17,756 08	229,956 90	628,177 65

To Amount Expended for Pumping Works to July 1, 1909.

	Previously Expended.	July, 1909.	Total
Real Estate	$ 73,463 29	$21,750 00	$ 95,213 29
Force Mains	624,058 03	....	624,058 03
Inlet Pipe	104,257 36	....	104,257 36
Docks, Basins and Canal	166,366 50	3,000 00	169,366 50
Engine House, Boiler House, Coal Houses, Chimney, Stables and Toilet Houses	349,461 90	28,422 57	377,884 47
Engineer's House	8,423 88	38 00	8,461 88
Stand Pipe and Tower	32,034 19	....	32,034 19
Pump Wells	54,221 56	....	54,221 56
Engine, Boiler and Furnace Repr's	773,521 14	9,920 44	783,441 58
Sewers	6,666 25	....	6,666 25
Electric Light Plant	3,800 22	....	3,800 22
Inspection	7,512 54	....	7,512 54
New Gallery	8,249 10	....	8,249 10
Traveling Crane and Coal Cars	2,590 00	....	2,590 00
Grounds, Fences, Gateway, Library,	210,403 51	....	260,665 25
Greenhouse and Belvedere	41,230 18	9,031 56	
Tunnel and Crib	201,169 94	663 00	201,832 94
Conduits and Wells	310,446 77	....	310,446 77
Miscellaneous	24,550 22	299 42	24,849 64
Total	$ 3,002,426 58	$ 73,124 99	$3,075,551 57

Estimated Valuation of Works

Real estate (estimated valuation)	$ 678,960	00
Buildings, docks, basins, tunnel and crib	2,748,264	88
Water pipes in use	6,017,743	83
Office furniture and fixtures	14,010	10
Meters in use	130,120	24
Tools and materials on hand—		
In office of Civil Engineer	29,075	50
In office of Superintendent of Construction	948	82
In Inspection Department	124	00
In Meter Department	2,870	39
In Pumping Works Department	16,162	33
In Hurlbut Fund Department	2,980	80
In Service Connection Department	1,975	95
At Storage Yards	173,523	10
At Emergency Station	7,300	00
Total	$9,824,059	94

Bonded Indebtedness.

The following table shows the dates of issue and amount of bonds of this department outstanding at this date. The total amount issued by the Board during its existence is $3,050,000.00, of which $300,000.00 were refunded and $1,570,000.00 redeemed, leaving a balance due of $1,180,000.00.

No. of Issue.	Act of	Issued	Payable	Amount	Rate of Intr'st	Redeemed or Refunded	Out-standing
7th	1873	Jan. 10, 1895	Jan. 10, 1925	100,000	4 "	....	100,000
* ref'nd	1869	Feb. 1, 1900	Feb. 1, 1930	200.000	3½"	20,000	180,000
	1873	Jan. 1, 1903	Jan. 1, 1933	50,000	3½"	... .	50,000
	1873	Sept. 1, 1903	Sept. 1, 1933	150,000	3½"	....	150.000
	1901	June. 1, 1904	June. 1, 1934	200,000	3½"	....	200,000
Refund	"	Aug. 1, 1904	Aug. 1, 1919	100,000	4 "	....	100,000
	1873 1901	Feb. 1, 1905	Feb. 1. 1935	150,000	3½"	....	150,000
**	1901	Aug. 1, 1908	Aug. 1, 1938	250,000	3½		250,000
				$1,200,000		$20,000	$1,180,000

** $75,000 in bonds of this issue are held by the Sinking Fund of this Board.

Respectfully submitted,
BENJ. F. GUINEY,
Secretary.

REPORT OF THE GENERAL MANAGER

Detroit, Mich., July 1, 1909.

To the Board of Water Commissioners, of the City of Detroit:

GENTLEMEN:—I herewith submit my report as General Manager, one in detail, for filing, which necessarily covers a great deal of matter already covered by the reports of department heads, and to prevent repetition, this general summary.

The year has been one of a great amount of labor, planned and carried on satisfactorily to completion in most instances, and of a substantial advance in all, in the carrying out of large betterments in the system initiated by this Board, in the extension of the water and the completion of permanent buildings, notably the barn and tool house at the Pumping Station. This department has during the year laid twenty-nine miles of all kinds of water mains. We have been fortunate in experiencing no disastrous breaks entailing large loss of money and property during the period covered by this report, and our progress as a department has been even and satisfactory.

For the detail of the work initiated and carried on to its varied stages of completion I beg to refer to the detailed reports accompanying this short report, as well as my own detailed report herewith filed, of the Secretary and Civil Engineer containing data based upon their own personal knowledge through observation, which mine through its supervisory duties cannot be.

All of which is respectfully submitted.

H. S. STARKEY

General Manager.

REPORT OF THE CIVIL ENGINEER.

DETROIT, MICH., JULY 1ST, 1909.

To the Board of Water Commissioners of the City of Detroit:

GENTLEMEN:—Your Civil Engineer hereby respectfully submits a report of the work done by and under his direction, for the year ending June 30th, 1909. This embraces all operations carried on by the

Civil Engineering Department,
Construction Department,
Emergency Station, and at the
New Pumping Station and
Intake Crib.

Pressures

The water pressures throughout the year have generally been below what they were during the previous year. As the maximum pressure which can be carried on the pumps for the low service district is sixty pounds, the pressure at which the water is delivered to the consumer in that district, and that includes all the downtown section and the west side of the city, is dependent upon the loss of head, or frictional resistance, between the pumping station and the consumer. Until the new 48 inch Waterloo street main was put in service June 27th, 1909, the pressures throughout the city during the periods of large consumption were somewhat below normal. It will be seen by the accompanying table of pressures for the year that at all points not influenced by construction or some local condition, the frictional resistance has increased throughout the city on an average of about one pound. The pressures

Table of Pressures.

	LOCATION OF GAUGES.	Elevat'n above City datum	Elevat'n pounds above surface pump wells 92.00 at which engine gauges are set	AVERAGE DAILY GALLONS 73,380,162 July 1, 1907, to June 30, 1908. 26,857,139,195				AVERAGE DAILY GALLONS 76,210,276 July 1, 1908 to June 30, 1909				Increase or Decrease Friction during last year		Maximum hour observed August 3, 1908. 5,533,380 Gals 6 to 7 p. m. Daily Rate 132,201,120 Gals.		Minimum hour observed Nov. 29, 1908 1,903,495 Gals. 1 to 2 a. m. Daily Rate 45,683,880 Gals.	
				Pressures, Pounds			Fric. Loss Lbs.	Pressure, Pounds.			Fric. Loss, Lbs.	Pounds		Mean Pressure Lbs.	Fric. Loss. Lbs.	Mean Pressure Lbs.	Fric. Loss Lbs.
		Feet		High.	Low.	Mean		High.	Low.	Mean		Inc.	Dec.				
Low Service	Pumping Station	92.000	14.62	60	43	54.22	......	60	46	55.06	......	......	......	59 75	......	47.50	......
	Engine No. 32, Vanda and Jefferson	103.419	4.51	......	......	......	......	70	40	46 46	4.09	......	......	......	......	......	......
	Engine No. 26, Crane and Brinket	125.787	14.62	46	29	37 25	2 35	46	29	37.96	2.48	.13	......	38.50	6.63	33.50	......
	" No. 7, Concord near Jefferson	124.773	14.19	44	30	36.90	3.10	43	28	36 94	3.93	.83	......	35.00	10.56	33.00	0.31
	Truck No. 6, Elmwood and Fort	124.495	14.07	40	25	31 93	8.22	38	24	31.90	9.09	.87	......	30.00	15.68	30.00	3 43
	Engine No. 19, Congress near Jos. Campau	122.473	13.19	42	27	34.83	6.20	42	29	35.57	6 30	.10	......	33.00	13.56	30.00	4 31
	" No. 2, Hastings near Congress	120.981	12 55	37	25	31 07	10.60	39	24	31.44	11.07	.47	......	25.00	22 20	31.50	3.45
	Water Office, Randolph and Jefferson	125.176	14.36	33	23	28.09	11.77	34	19	27 82	12.88	1.11	......	19 50	25.89	28.00	5.14
	Truck No. 1, Wayne and Larned	116.738	10.70	36	24	30.78	12.74	......	......	......	......	......	......	......	......	......	......
	Engine No. 3, Griswold and Clifford	123.059	13.44	35	24	28.94	11.84	34	20	29 00	12.62	78	......	21.50	24.81	30.00	4.06
	" No. 8, Sixth and Baker	122 144	13.05	38	23	29.55	11.62	35	20	29.60	12.41	.99	......	20.00	26.70	31.00	3.45
	" No. 4, Eighteenth near Howard	116.179	10.47	35	22	30.02	13.73	35	19	29.69	14.90	1.17	......	26.50	22.78	32.00	5.03
	Truck No. 4, Twentieth near Rose	124.825	14.21	33	14	26.64	13 37	33	13	28.07	12.78	......	.59	21.50	24.04	28.00	5.29
	Engine No. 10, Sixteenth and Bagg	125.282	14.41	34	15	27.32	12.49	33	14	27 47	13.18	.69	......	18.50	26.84	30.00	3.09
	" No. 15, Hubbard near Fort	114.617	9.79	40	22	31.91	12.52	38	20	31.71	13.56	1.04	......	20.50	29.46	33.00	4.71
	" No 29, Solvay and Jefferson W	115.052	9.98	35	11	26.35	17.89	36	12	30.51	14.57	......	3.32	12.50	37.27	32.50	5.02
	Truck No. 13, Lewerenz and Fort	115.564	10.20	......	......	......	......	35	22	30.33	14.53	......	......	......	......	......	......
	Engine No. 27, Junction and Rogers	113.736	9.41	39	19	30.89	13.92	38	18	32.05	13.60	......	.32	18 50	31.84	24.50	13.59
	" No. 14, Scotten near Michigan	121.368	12.71	35	19	28.21	13.30	35	16	28 71	13.64	.34	......	16.00	31.04	31.00	3 79
	" No. 22, Michigan near Hammond	119.444	11.88	35	15	26.60	15.74	35	12	26.92	16 26	.52	......	12.00	35.87	30.00	5.62
	Truck No. 10, Sheridan and Mack	140.254	20.89	36	22	29.15	4.18	38	23	30.75	3.42	......	.76	26.00	12.86	25 50	1.11
	Engine No 18, Mt. Elliott near Sylvester	146.233	23.48	35	19	26.17	4.57	32	20	26.19	4 39	......	.18	23.50	12.77	23.50	0.20
	" No. 11, Grandy and Gratiot	143 211	22 17	32	19	26.40	5.65	36	21	27.06	5.83	..18	......	22.00	15.58	25.50	......
	" No. 6, High near Hastings	142.631	21 92	28	15	20.77	11.53	29	11	20.67	12.37	.85	......	15.90	22.83	21 50	4.08
	Storage Yard, Orleans and Erskine	150.635	25.38	24	13	17.64	11.20	23	10	17.73	11.95	.75	......	9.50	24 87	17.50	4.62
	Truck No. 5, Russell and Erskine	147.742	24.13	26	13	19 53	10.56	25	12	21.15	9.78	......	.88	13 00	12.62	19.00	4.37
	Engine No. 5, Alexandria near Cass	146 693	23.68	25	12	18.88	11.66	22	9	18.44	12.94	28	......	9 00	27.07	20.00	3.82
	" No. 12 Sixteenth and Grand River	141.546	21.45	26	13	20.14	12.63	26	8	19.68	13.83	1.20	......	8 50	29 80	20.50	5.55
	" 31, Cobb, near West Boulevord	135.115	18.66	......	......	......	......	34	20	27.98	3.98	.42	......	21.00	15.65	24.50	......
	" No. 20, Baldwin and Gratiot	145.368	23.10	34	20	27 56	3.56	34	20	27.98	3.98	.42	......	21.00	15.65	24.50	......
High Service	Pumping Station	92.000	......	85	58	66.68	......	95	55	67.08	......	......	......	83.50	......	59.00	......
	Engine No. 18, Mt Elliott near Sylvester	146.233	23.48	52	30	39.69	3.51	62	25	39.03	1.01	1.79	......	43.00	17.02	34 50	1.02
	" No. 23, Moran and Boulevard	151.288	26 96	41	24	32.36	7.36	45	21	32 14	7.98	62	......	30.50	26.04	30.00	2.04
	" No. 28, Riopelle and Milwaukee	155 556	27.52	36	19	29.47	9.09	43	15	28.92	10.64	.95	......	......	......	28.50	2.98
	" No. 13, Russell and Ferry	157.304	28.27	38	20	30.48	7.93	37	17	28.79	10.02	2.71	......	24.00	31 23	28.00	2.73
	" No. 17, Cass near Amsterdam	152 825	26.33	37	17	29.92	10.43	40	15	28.70	12.05	1.62	......	17.00	40.17	29.00	3 67
	" No. 21, Lincoln near Piquette	154.880	27.22	37	16	30.32	9.14	37	14	29.36	10.05	1.36	......	14.50	41.78	30.00	1.78
	" No. 24, Mott near John R	155.855	27.64	35	14	28.29	10.65	35	10	27.33	12.11	1.46	....	11.00	44.86	28.00	3.86

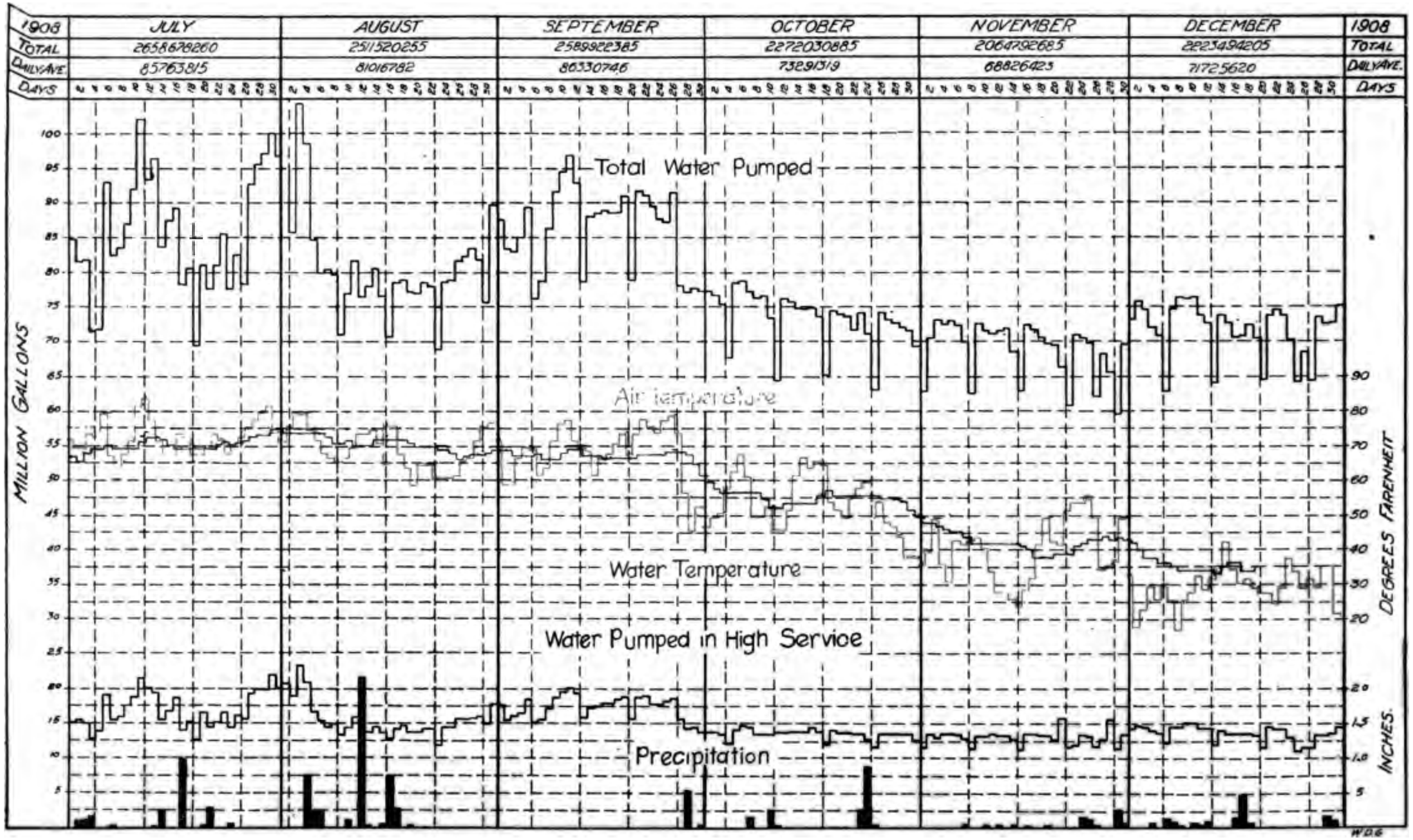
at the pumping station on the low service increased from an average of 54.22 lbs. in 1907-8 to 55.06 lbs. in 1908-9; and on the high service from 66.68 to 67.08. The average pressure at the water office decreased from 28.09 in 1907-8 to 27.82 in 1908-9; at engine No. 29, Solvay and Jefferson Avenue West, owing to the extension of the 42 inch main in Jefferson Avenue West, the pressure increased from 26.35 lbs. to 30.51 lbs.; at the storage yard, Orleans and Erskine, the pressure increased from 17.64 to 17.73; at engine No. 21, on Cass near Amsterdam, the pressure decreased from 29.92 to 28.70; and at engine No. 24, on Mott near John R, the pressure decreased from 28.29 to 27.33. The completion of the 48 inch Waterloo street main to Chene street, on June 27th, 1909, entirely changed the conditions that obtained prior to that time, and the effect which that line has had upon the pressure will be found on page [illegible] 47 of this report.

Consumption of Water.

The average daily pumpage for the year has increased from 73,380,162 gallons in 1907-8 to 76,210,276 gallons in 1908-9, or an increase of 3.84 per centum.

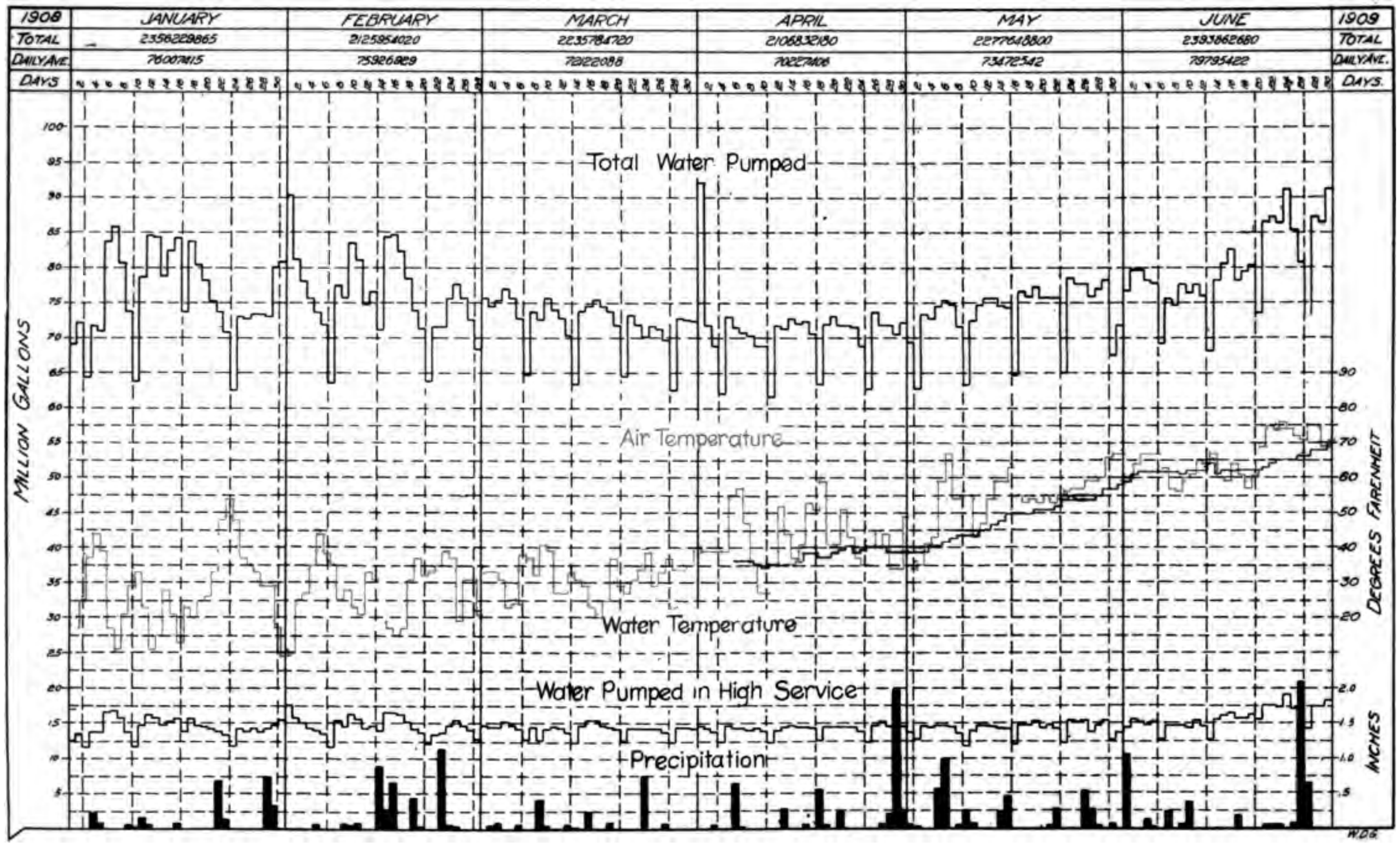
The quantity of water taken from our pipes and used by the Detroit Fire Department at fires during the year, amounted to 21,474,340 gallons. There were 503 fires at which at least one engine worked not less than five minutes; and water was drawn from 743 hydrants and 60 reservoirs. The average number of minutes each hydrant was used was 93.0 and each reservoir 84.8 minutes. The average number of gallons delivered per minute was 287.3 by each hydrant and 255.2 gallons by each reservoir.

DAILY WATER CONSUMPTION, AVERAGE TEMPERATURE AND PRECIPITATION



1908	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	1908
TOTAL	2658678260	2511520255	2589922385	2272030885	2064792685	2223494205	TOTAL
DAILY AVE.	85763815	81016782	86330746	73291319	68826423	71725620	DAILY AVE.

DAILY WATER CONSUMPTION, AVERAGE TEMPERATURE AND PRECIPITATION



The maximum and minimum average daily quantity of water supplied the system is as follows:

	Gallons.
Maximum day, Aug. 3, 1908	104,495,140
Minimum day, Nov. 29, 1908	59,444,470
AVERAGE DAILY	76,210,276
Total for year	27,816,750,890
Maximum hour, Aug. 3, 1908, 6 to 7 p. m.	5,533,580
RATE PER DAY, AT MAXIMUM HOUR	132,201,120
Minimum hour, Nov. 29, 1908, 1 to 2 a. m.	1,903,495
Rate per day, at minimum hour	45,683,880

The maximum daily consumption was 137 per centum, the minimum daily was 78 per centum, the maximum hourly was 174 per centum and the minimum hourly was 60 per centum, of the average consumption.

Free Water

A careful estimate has been made of the quantity of water furnished free to various municipal and charitable institutions. From the summary given below it appears that no charge is made for seven and one-tenth per centum of the entire pumpage, or a quantity equal to five and one-third times that of the combined consumption of the villages of Highland Park, River Rouge, Ecorse and Hamtramck. Belle Isle alone used 18 per centum more water than Highland Park and River Rouge combined.

Consumption in gallons of water per annum for which no charge is made:

	Gallons.
Department of Parks and Boulevards—Seventeen parks, as follows: Cadillac Square and Convenience Station, Campau Park, Stanton Park, Macomb Park, Clinton Park, West Side Park, Perrin Park, Capitol Park, Washington Park, Cass Park, Grand Circus Park, Owen Park, Clark Park and Skating Pavilion, Grand Boulevard, Merrill Fountain, Palmer Park and Water Works Park—total	851,042,537

Belle Isle	285,587,250
Eleven parks, parkways, boulevards, lawns, etc	2,504,940
Board of Education—88 school houses	312,609,000
Fire Comission—32 engine companies, 3 hose companies, 13 ladder companies, 1 water tower and supply dept	22,812,500
Fires	21,474,340
Police Comission—12 stations, harbor master's office and headquarters	8,316,525
Board of Health—office buildings	90,000
Public Lighting Commission—office building and plant	11,118,000
City Buildings and Streets—Municipal Building, City Hall, G. A. R. Building, Water Office, Clara Public Bath, Eastern and Western Markets, 3 barns (Dept. Public Works), Street Sprinkling and Flushing (Dept. Pub. Works), Street Sprinkling (D. U. R.), 70 Sanitary Drinking Fountains, 52 Horse Troughs and Flooding of Trenches—total	270,719,190
Charitable Institutions—Detroit Museum of Art, Detroit Sanitary Works, Harper Hospital, St. Mary's Hospital, Grace Hospital, and Nurses' Home, Emergency Hospital, Children's Free Hospital, Solvay Hospital, Woman's Hospital and Foundling's Home, Young Men's Christian Association, Railroad Y. M. C. A., House of the Good Shepherd, McGregor Mission, German Protestant Home, House of Providence, St. Vincent's Orphan Asylum, St. Felician Convent, Little Sisters of the Poor and 24 other institutions—total	198,742,850
Total yearly consumption of free water	1,985,017,132

Fire Protection.

Every effort possible has been made to comply with the recommendations of the Detroit Fire Department, and to provide sufficient water for first class fire protection. During the past year 8.3 miles of pipe, at a total cost of $76,872.72, have been laid for this purpose, consisting of 5,464 feet of 6 inch, 20,872 feet of 8 inch, 5,583 feet of 10 inch and 11,818 feet of 12 inch pipe.

Location, Size and Cost of Pipe Laid for Fire Protection.

Location.	Feet.	Diameter.	Cost.
Ash, Wabash E. to Alley	160	6 in.	$ 263 59
Berlin, W. of McDougall	157	6 "	188 40
Blackstone, E. of Elsemore	411	6 "	327 30
Canfield, W. of Mt. Elliott	47	6 "	42 30
Ellery, Charlevoix to Arndt	260	6 "	218 40
Elsemere, Blackstone to Krupp	280	6 "	222 50
Harper and Jos. Campau	69	6 "	241 15
Holborn and Beaufait	121	6 "	94 38
Hubbard, N. of Brandon	105	6 "	78 36
Holcomb and Chapin	46	6 "	19 78
Kirby, Concord to Bellevue	377	6 "	396 68
Lauderdale, W. of Junction	315	6 "	347 01
Owen, E. and W. of Beaubien	420	6 "	302 40
Regular and Lewerenz	460	6 "	405 80
Shady Lane, 25th to Boulevard	317	6 "	244 09
Superior, Brush to Beaubien	27	6 "	109 01
Thirtieth, Rich to Herbert	515	6 "	405 94
Thompson Court, S. of Hancock	324	6 "	489 44
Vermont and Marquette	449	6 "	323 28
Warren, Mt. Elliott to Hancock	604	6 "	506 00
Total 6 inch	5,464		$5,225 81
Alfred, Beaubien to St. Antoine	506	8 "	960 36
Ash, W. of Trumbull	162	8 "	524 88
Beaufait, Holborn to Medbury	268	8 "	353 29
Beaubien, Owen to Westminster	1,052	8 "	1,314 58
Beech, 5th to 1st	1,533	8 "	2,780 38
Canfield, W. of Mt. Elliott	420	8 "	716 66
Chapin, McClellan to Holcomb	665	8 "	750 29
Charlevoix, Seyburn to Beals	243	8 "	339 43
Charlevoix, Ellery to Mt. Elliott	754	8 "	910 00
Driggs, Junction to Campbell	599	8 "	646 02
Ferry, Concord to Helen	586	8 "	954 73
Fifth, Fort to Alley S. Howard	566	8 "	1,259 75
Harper, Dubois to Jos. Campau	210	8 "	353 45

Herbert, 28th to 31st	798	8	"	864 81
McDougall, Cleveland to Preston	1,939	8	"	2,758 54
Marantette, Vermont to 12th	389	8	"	664 08
Marquette, Vermont to 12th	356	8	"	485 22
Mitchell, N. Blvd. to Milwaukee	625	8	"	911 93
Mullett, E. of Chene	744	8	"	1,333 36
Putnam, 4th to Alley W. of 2nd	727	8	"	1,454 28
Rademacher, Fort to Lafayette	1,239	8	"	1,186 79
Regular, Military to Dragoon	388	8	"	509 02
Second, Fort to Alley S. Howard	908	8	"	2,090 68
Spruce, W. of Brooklyn	622	8	"	1,014 36
Superior, Brush to Beaubien	223	8	"	380 43
Third, Fort to Abbott	1,076	8	"	2,324 06
Twenty-fifth, Porter to Baker	1,062	8	"	1,610 29
Vermont, Myrtle to Magnolia	537	8	"	926 65
West End, Mackie to N. R. R	1,029	8	"	1,114 88
Winder, St. Antoine to Hastings	646	8	"	1,372 45
Total 8 inch	20,872			$32,865 65
Adelaide, Beaubien to Antoine	506	10	"	1,309 11
Adelaide, W. of Rivard	404	10	"	1,413 80
Agnes, Townsend to Boulevard E	1,066	10	"	1,893 33
Beaubien, Madison to Elizabeth	867	10	"	2,216 07
Beaumont, Pulaske to Peterson	838	10	"	1,117 47
Forest, Hastings to St. Antoine	622	10	"	1,754 49
Forest, Dubois to W. of St. Aubin	872	10	"	2,623 26
Warren, Bellevue to Beaufait	408	10	"	710 00
Total 10 inch	5,583			$13,037 53
Beaubien and Horton	689	12	"	2,005 42
Cadillac and Shoemaker	2,158	12	"	3,700 35
Marantette, Vermont to 14th	744	12	"	1,664 41
Scotten, Porter to Dix	1,485	12	"	3,241 77
Springwells, Granite to Chamberlin	604	12	"	967 56
Summit, N. of Jefferson W	1,073	12	"	2,101 06
Trumbull, Michigan to Myrtle	4,038	12	"	9,892 09
Twenty-first, Howard to Bristol	1,028	12	"	2,171 13
Total 12 inch	11,818			$25,743 79

Population.

The estimate of the population is based upon the number of families, as determined by the Board, and upon the census returns. The number of families are counted each year, and may be considered correct; while the number of persons per family, based upon the 1900 census and the rate of change which governed previous to that census, is approximately correct. Any errors that are introduced are comparatively small for the first few years immediately following a census determination, but as nine years have elapsed since such returns have been received, it should be understood that the population as herein computed may be subject to some correction.

The total number of families as determined by the June census of the Board was 96,079 and assuming 4.586 persons per family, as indicated in the annual report for 1904, the estimated population within the limits of the city is 440,618. The count within the city limits includes 284 families which are not supplied with water. Outside the city limits there are 402 families not included in the enumeration of the villages. The estimated number of persons in Detroit supplied with water is 439,316, and as there are 83,992 taps in the city, the number of persons per tap is 5.23. Allowing 5.23 persons per tap for the villages the estimated population supplied is as follows:

Place.	No. families	Est. Pop. supplied	Gals. daily per capita
Detroit	95,795	439,316	168.4
Outside Detroit and villages	402	1,844	——
	taps		
Highland Park	844	4,414	63.5
River Rouge	823	4,304	
Ecorse	293	1,532	
Hamtramck	692	3,619	94.0
Total population supplied		455.029	

Supply of Water to Villages.

HIGHLAND PARK.

This system was constructed in 1896, and consisted of five miles of pipe. Since that time no provision has been made for an increased supply at the city limits, nor have any main supply pipes been laid, although the total pipeage is now 16¾ miles. A 24 inch main should be laid in Oakland Avenue, and additional meters should be set at the city limits; and until this work is done pressures will remain too low.

RIVER ROUGE AND ECORSE.

In 1900-1 about six and one-half miles of pipe were laid in River Rouge, including an eight inch supply pipe across the Rouge River. The system supplied through this eight inch pipe has increased until now River Rouge and Ecorse together have 16 miles of pipe. Not only is the main supply pipe too small, but its capacity is reduced by a leak at the river crossing. The extension of the 42 inch main in Jefferson Avenue West to Solvay Avenue has improved matters, but with even a further extension of this line, pressures in these villages will, at times, be below normal.

New Mains and Extensions.

More water pipe, considering its size, has been laid during the past year than ever before in Detroit during the same period of time. Considering the capacity of the pipe laid in the fiscal year 1908-9 as 100 per centum, the relative amounts laid for the previous six years are as follows:

Year.	Per Centum	Year.	Per Centum
1909	100	1905	31
1908	23	1904	11
1907	19	1903	21
1906	9		

Based on the size or cross-section as well as length, the amount laid last year was more than five times the average amount laid during the previous six years.

The principal lines laid were as follows:

Street.	Diameter.
Bewick, Jefferson to Kercheval, two lines of	48 inch
Kercheval, Holcomb, Lorain, Waterloo, Cleveland, McDougall and Jay from Bewick to Chene	48 inch
Hurlbut, Pumping Station to Kercheval	42 inch
Jefferson W., Artillery to Solvay	42 inch
Michigan, Larkins to Central	24 inch
Artillery and Dix, Army to M. C. R. R.	16 inch
Trumbull, Michigan to Grand River	12 inch

There are 752.09 miles of street mains in service, and the total amount expended for the laying of pipe inside the city limits during the year was $593,029.71.

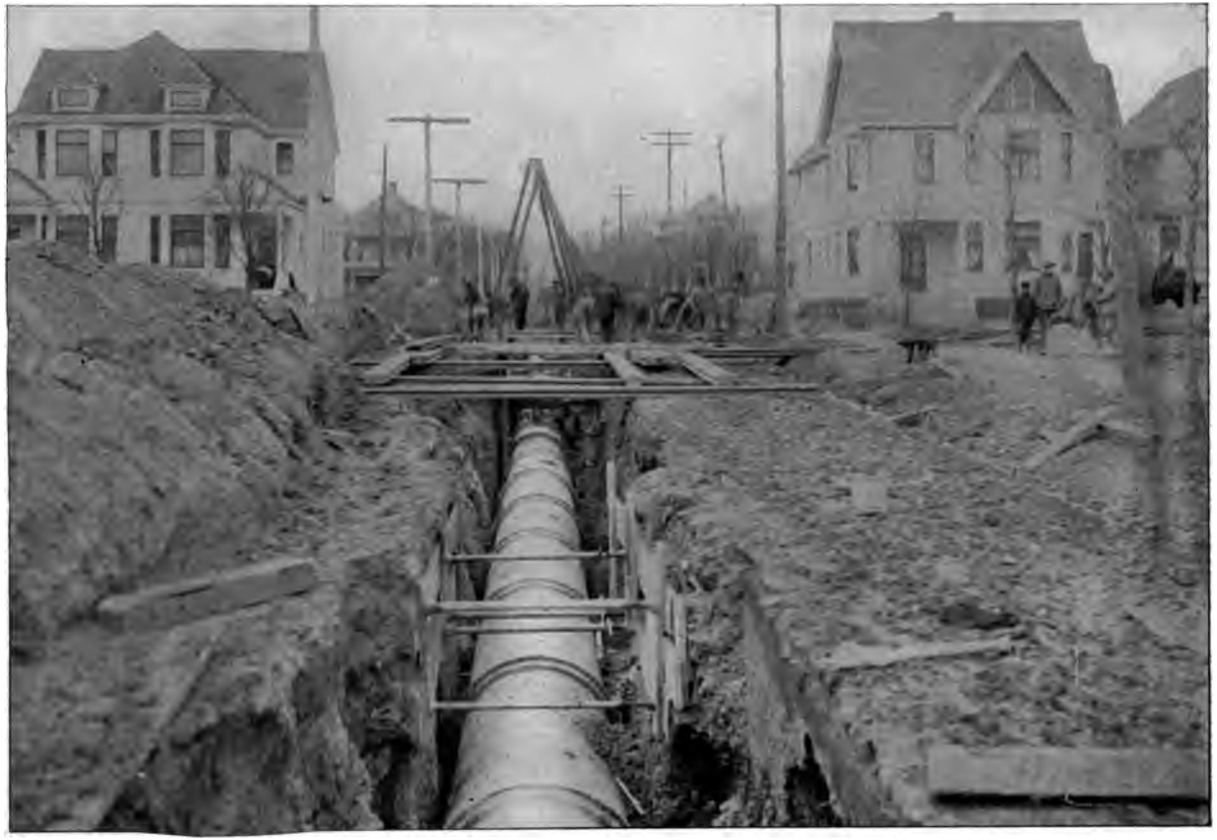
Milage of Different Sizes of Pipe and the Per Centum each size is of the total.

Year	1901		1902		1903		1904		1905		1906		1907		1908		1909	
Diam. of Pipe	Milage of Diff Sizes of Pipe	Per Cent'm of Total	Milage	Per Centum	Milage	Per Centum	Milage	Per Centum	Milage	Per Centum	Milage	Per Centum	Milage	Per Centum	Milage	Per Centum	Milage	Per Centum
2	0.823	0.144	0.871	0.149	0.871	0 141	0.871	0.135	0 871	0.131	0.871	0.127	0.871	0.123	0.874	0.120	0.874	0.117
3	11 973	2.095	11.973	2.059	11 973	1.932	11.907	1.849	11 808	1.781	11.756	1.720	11.756	1.665	11.430	1.568	11.370	1.511
4	152.513	26.630	153.529	26.450	161.891	26.207	165.186	25 610	165.570	24.935	164.947	24 120	164.258	23.120	162.950	22.375	159.200	21.220
6	259.469	45.450	264.356	45 400	284 409	46 100	300.756	46.660	311.462	46 984	324 896	46.601	343.653	48.450	356.100	48.863	368.501	48.920
8	61 155	10.700	61.490	10.610	64 607	10.470	69.353	10.766	74.206	11 180	76.434	11.174	80.468	11.340	81.900	11.265	87 250	11.610
10	30.230	5.290	30.995	5.345	32.623	5.280	33.783	5.240	34 561	5.225	38.706	5.670	40.837	5.750	41 912	5.770	43.400	5 770
12	7.114	1.245	7.114	1.184	8.710	1.411	10.071	1.572	10.415	1.580	11.098	1.650	13.637	1.934	16.150	2.248	19.090	2.554
16	10.198	1.785	10.198	1.753	10.155	1.665	10.463	1.652	10 463	1.595	10.468	1.550	10.468	1.492	10.840	1 490	11.700	1.555
18	.015	.003	.016	.003	.016	.003	.016	.003	.016	.003	.016	.002	.016	.002	.016	.002	.016	.002
20	.074	.014	.074	.013	.074	.012	.074	.011	.074	.011	.074	.011	.074	.011	.074	.010	.074	.010
24	16 020	2.802	16.020	2.750	16.068	2.601	16.068	2,491	16.068	2 422	16 068	2 351	16.068	2.273	16.622	2 292	17 010	2.261
30	10.321	1.806	10.321	1.774	10.331	1.673	10.220	1.601	10 220	1.558	10.220	1.504	10.232	1.407	10.350	1.480	10 350	1.375
36	.134	.023	.682	.117	1.436	.232	1.412	.223	1.442	.218	1.442	.211	1 495	.210	1.495	.205	1.495	.200
42	11.433	2.010	13.903	2.390	14.044	2.270	14.056	2.184	15.756	2.374	15.756	2 306	15.756	2.220	17.193	2.369	18.300	2.434
45	.020	.003	.020	.003	.020	.003	.020	.003	.020	.003	.020	.003	.020	.003	.020	.003	.020	.003
48									....	....	....	....	....	....	....	....	3.440	.458
Total Miles	571 490		581 562		617.248		644.285		662.952	....	682.772	....	709.604	....	727.780	....	752.090	....
Storage Cap'cy System in Mil. Gals.	13.22		14.46		15.00		15.30		16.10	....	16.33	....	16.83	....	17.43		20.00	....

Average diameter of Pipe June 30, 1909—$9\frac{1}{10}$

Summary of the Amount of Pipe laid inside the City of Detroit and outside Villages, from July st 908 to June 30th 1909.

LOCATION	Feet	Size	COST OF CONSTRUCTION										
			Pipe	Specials	Lead	Gates	Misc.	Wells	Cartage	Outside Bills	Sup. & Eng.	Labor	Total
City of Detroit........	8 47,309 29,536 8,232 15,814 4,561 2,052 58 5,929 18,181	4-in. 6-in. 8-in. 10-in. 12-in. 16-in. 24-in. 36-in. 42 in. 48-in.	$284,655 39	$16,035 48	$17,129 20	$23,677 25	$8,507 17	$19,979 97	$16,267 95	$9,418 97	$14,292 42	$183,065 91	$593,029 71
Total........	131,680												
Village of River Rouge....	6,403 36	6-in. 4-in.	$2,719 17	$222 51	$278 54	$235 06	$77 32	$267 25	$211 62	......	$146 70	$1,865 68	$6,023 85
Total........	6,439												
Village of Hamtramck.....	1,277	6-in.	$541 79	$79 68	$45 99	$68 14	$4 63	$62 19	$37 88	......	$30 46	$440 14	$1,310 90
Village of Grosse Pointe Park..........................	795	6-in.	$330 62	$5 36	$28 18	$36 56	$27 16	$22 62	$35 13	......	$26 60	$578 33	$1,090 56
Village of Ecorse......	104	6-in.	$44 74	$ 14 00	$12 26	$28 44	$5 98	$46 00	$13 94	......	$6 25	$84 58	$256 19
Village of Highland Park...	13,744	6-in.	$5,894 67	$251 67	$504 79	$406 46	$47 70	$215 16	$297 88	......	$309 82	$4,776 36	$12,704 51
Grand Total.........	154,039	....	$294,186 38	$16,608 70	$17,998 96	$24,451 91	$8,669 96	$20,593 19	$16,864 40	$9,418 97	$14,812 25	$190,811 00	$614,415 72



48 IN PIPE LINE

Large Force Mains.

In order to improve the pressure in the low service district, on May 19, 1908 the Board awarded a contract to the Dimmick Pipe Company, of Birmingham, Alabama, for 7,490 tons of 48 inch cast iron pipe at $22.95 per ton, for a new force main, to extend from the pumping station to Chene Street, via Bewick, Kercheval, Helcomb, Lorman, Waterloo, Mt. Elliott, Cleveland, McDougall and Jay Streets, and on February 9th, 1909, the Board ordered a further extension of this main on Jay Street to Gratiot Avenue.

The 48 inch valves were designed in the engineering department and are of the solid disk type.

The first car of pipe arrived in Detroit, July 14th, 1908, work on the trench began July 10th, 1908, and was prosecuted continually until the connection was completed at Chene Street, June 30th, 1909. From the beginning the pipe laying proceeded at the average rate of 63.8 lineal feet per day, at an average cost of $1,111.70. An itemized statement of the cost of this line is shown in the accompanying tables, together with other data of interest; and from these it will be seen that, although the work continued without interruption all winter, the cost was exceedingly low; in fact, considering the unit cost of each item entering into the work, it is believed that the cost of this line, $17.43 per lineal foot, is less than that of any large line ever laid in Detroit.

This line crossed the old Bloody Run on McDougall Avenue, between Waterloo and Jay Streets. In order to secure a solid foundation, 7 concrete piers, 4 feet by 5 feet in section, 36 feet centers, and having a maximum height of 10.4 feet, were constructed, and a reinforced concrete beam, to sup-

Cost of Construction of 48" Force Main

LOCATION	Feet	Size	Pipe	Specials	Lead	Gates	Misc.	Wells Includ. Labor	Cartage	Outside Bills	Sup. & Eng.	Labor Not Inc. Wells	Total
Bewick, W. side from Jefferson to Kercheval..........	1,176	48"	$11,267 99	....	$589 85	....	$151 30	....	$809 80	....	$488 00	$6,745 20	$20,052 14
Bewick, W. side, crossing Kerchevel..................	49	48"	$469 50	....	$24 30	....	$2 32	....	$23 02	....	$21 12	$325 81	$866 07
Bewick, E. side, from Jefferson to Kercheval....... ..	1,268	48"											
and Kercheval crossing Bewick....................	92	48"	$12,571 09	$1 094 84	$627 87	$1,024 00	$103 04	$658 29	$745 86	.. ....	$658 74	$9,524 89	$27,008 62
Kercheval from Bewick to Hurlbut.	206	48"	$1,973 81	....	$96 92	....	$44 60	$22 98	$161 70	$90 32	$94 80	$1,560 43	$4,045 56
Kercheval crossing Hurlbut	87	48"	$718 62	$499 23	$67 64	....	$72 49	....	$40 73	....	$65 31	$1,165 54	$2,629 56
Kercheval from Hurlbut to 133' west of Cadillac........	464	48"	$4,282 99	$415 61	$265 31	$1,070 34	$90 67	$592 51	$326 98	....	$266 58	$3.699 64	$11,010 63
Kercheval from 133' west of Cadillac to Holcomb, and	1,489	48"	....	....	....	....	....	....	....	....	....	....	....
Holcomb crossing Kercheval......	31	48"	$10,362 86	$570 36	$589 89	....	$299 85	....	$761 18	$896 65	$535 87	$7,954 06	$21,970 72
Holcomb from Kercheval to Lorman, Lorman west to Crane, Crane north to Waterloo, and Waterloo west to 100' W. of Concord.	7,217	48"	$68,685 88	$1,117 42	$3,554 52	$3,072 00	1,235 26	$1,437 90	$2.937 68	$196 48	$2,819 70	$30,550 67	$115;607 51
Waterloo from 100' west of Concord to Bellevue........	358	48"	$3,286 50	$369 10	$173 59	....	$95 99	$42 26	$219 98	....	$165 20	2,420 67	6,773 29
Waterloo from Bellevue to Mt. Elliott.................	1,104	48"	....	....	....	....	....	....	....	....	....	....	....
Mt. Elliott from Waterloo to lot No. 2 north..............	181	48"	....	....	....	....	....	....	....	....	....	....	....
Cleveland from Mt. Elliott to McDougall.................	2,386	48"	....	....	....	....	....	....	....	....	....	....	....
McDougall from Cleveland to Jay........................	540	48"	....	....	....	....	....	....	....	....	....	....	....
Jay from McDougall to Jos. Campau.	548	48"	$45,368 99	$2,065 62	$2,033 56	$2,176 78	$842 90	$4,921 54	$3.693 87	$359 06	$2.102 22	$22,626 38	$86,190 92
Jay from Jos. Campau to Chene.....	985	48"	$9,351 67	$235 41	$1,436 19	$1,060 10	$273 28	$1,018 04	$896 83	$531 87	$504 40	$6,372 74	$20 680 53
	18,181	48"	$168,339 90	$6,367 59	$8,459 64	$8.403 22	$3,211 60	$8,693 52	$10,617 63	$2,074 38	$7.721 94	$92,946 03	$316,885 55

port the pipe, 3 feet 6 inches by 4 feet in section and 35 feet 6 inches in length was built between each pair of piers.

As with all other lines laid by the Board the pipes for this main were each subjected to a water pressure of 300 pounds per square inch at the foundry, and after being laid and caulked, to a pressure of 100 pounds per square inch in the open trench for at least two hours.

After the line had been completed and filled, a section of 48 inch pipe, 14,907 feet long, containing 1,360-48 inch joints, 7-42 inch joints, 2-36 inch joints and 38-12 inch joints, was carefully tested for leaks, by feeding the entire line through a new one inch meter, for a period of 20 hours. The amount supplied this line was found to have been 690 cubic feet, or at the ratio of 258 gallons per minute. In order to close off the section under test the following gates were closed and believed to have been tight: 2-48 inch, 1-42 inch, 1-36 inch and 15-12 inch.

The effect of this line in the low service district, and this district consumes 80 per centum of all water pumped, has been to increase pressures very materially. The loss of head or friction between the pumping station and Woodward Avenue has been decreased about three pounds, at average, and about five pounds at maximum pumpage.

Pressures during maximum consumption are below normal in the upper service district, and this also includes Highland Park, Palmer Park and the State Fair grounds. The Civil Engineer, November 10th, 1908, submitted plans to the Board for a 48 inch force main to extend from the pumping station to the north and west sides of this district. On December 19th, 1908, the American Car & Foundry Com-

DISTRIBUTION SYSTEM

Total amount of pipe laid and discontinued in the locations named during the year ending June 30, 1909.

Size in Inches	Detroit		River Rouge		Hamtramck	Fairview	Highland Park		Ecorse	Total Feet Laid	Total Feet Discontinued	Net Increase
	Feet Laid	Feet Disc.	Feet Laid	Feet Disc.	Feet Laid	Feet Laid	Feet Laid	Feet Disc.	Feet Laid			
3	....	327	......	......	....	......	......	......	....	....	327	....
4	8	19,903	36	40	....	......	......		....	44	19,943	....
6	47,309	4,259	6,403	59	1,277	795	13,744	20	104	69,632	4,338	....
8	29,536	673	.....	......	....	......	.....	......	...	29,536	673	....
10	8,232	219	......	......	....	......	......	......	....	8,232	219	....
12	15,814	151	.....	......	... ...	......	......	......	....	15,814	151	....
16	4,561	......	......	......	....	......	......	......	....	4,561	......	....
24	2,052	......	......	......	....	......	......	......	....	2,052	......	....
30	....	14	......	......	....	... .	......	......	....	....	14	....
36	58	....	......	......	....	......	......	......	....	58	......	....
42	5,929	......	......	......	....	......	......	......	....	5,929	......	....
48	18,181	......		......	....	......	......	......	....	18,181	....	....
Total	131,680	25,546	6,439	99	1,277	795	13,744	20	104	154,039	25,665	128,374
Total Amount in miles......................										$29\frac{919}{5280}$	$4\frac{4545}{5280}$	$24\frac{1654}{5280}$

TOTAL FEET IN DISTRIBUTION SYSTEM.

Number of feet of pipe of the sizes indicated, inside and outside of Detroit, June 30, 1909.

Size in Inches	June 30 1908	Laid from July 1, 1908 to Jun. 30, 1909	Disc. during year ending Jun. 30, 1909	Total Feet in System June 30, 1909	In Detroit June 30, 1909	Outside Detroit June 30, 1909
48		18,181	....	18,481	18,181	....
45	103	....	....	103	103	....
42	90,779	5,929	....	96,708	96,708	....
36	7,890	58	....	7.948	7.948	....
30	54,627	......	14	54,613	54,613	....
24	87,765	2,052	.....	89,817	89,817	....
20	393	....	....	393	393	....
18	87	....	....	87	87	....
16	57,230	4,561	....	61,791	60,976	815
12	85,223	15,814	151	100,886	92,858	8,028
10	221,306	8,232	219	229.319	222,287	7,032
8	431,970	29,536	673	460,833	404,119	56,714
6	1,879,943	69,632	4,338	1,945,237	1,717,286	227,951
4	860,378	44	19,943	840,479	806,763	33,716
3	60,344	....	327	60,017	60,017	....
2	4,624	....	....	4,624	4,624	....
....	3,842,662	154,039	25,665	3,971,036	3,636,780	334,256
Miles	$727\frac{4102}{5280}$	$29\frac{919}{5280}$	$4\frac{4545}{5280}$	$752\frac{476}{5280}$	$688\frac{4140}{5280}$	$63\frac{1616}{5280}$

pany was awarded a contract for 9,587 tons of 48 inch pipe and 1,100 tons of 42 inch pipe, $23.00 per ton. The work of laying this main, which will cost about one million dollars to construct to St. Aubin Avenue, was begun on Palmer Avenue, west from Concord, May 1st, 1909, and 910 feet of 48 inch pipe have been laid to June 30th, 1909.

New Pumping Station.

The specifications and plans for the new pumping station, having been revised and corrected by the Board, the Civil Engineer was directed, May 25th, 1909, to proceed with the construction of the foundation and basement up to the grade line. It is estimated it will require 40,000 cubic yards of excavation and 12,000 cubic yards of concrete for the basement of the engine house, and an organization is now being effected to prosecute this work.

Specifications for three thirty million gallon pumping engines have been prepared, and were reviewed and accepted by the Board June 21st, 1909. These specifications provide for vertical, triple expansion, flywheel, double "A" frame, three plunger, self contained, surface condensing pumping engines, to use steam at 150 pounds pressure and to pump water against a normal pressure of 68 pounds and a maximum pressure of 100 pounds per square inch.

General Construction at Pumping Station.

The coal shed described in the annual report for 1907-8, with an ordinary capacity for 2,600 tons, was completed and put in service, and tracks for coal conveying cars were installed.

Plans have been prepared for a coal unloading tower and conveyor, to unload boats in the canal and place the coal in the present sheds and in the new pumping station; and on April 21st, 1909, the Board directed the Civil Engineer to build the foundations for these structures.

To permit the foundations to be built for the new coal conveyor, changes were made in the 5 foot conduit which supplies engine No. 4, near the southwest corner of the west coal shed, as follows: abandoned 51 feet of old conduit; built one 8 foot and one 10 foot junction well; built in tunnel 100 feet of 5 foot circular conduit; removed the brick work from 37 feet of the abandoned conduit.

Electrolysis.

During May and June, 1909, an electrical survey of the underground conditions in Detroit was made, (1) to determine the positive and negative regions, (2) to test the efficiency of copper bonds connecting different pipe systems, and (3) in some cases, to measure the amount of electric current flowing on the water mains.

The volt-meter readings show several well-defined regions where the water mains are positive to the street and railway tracks, and these are shown on the accompanying distribution map by shaded areas.

At various times when a pipe has been found positive to another near it, the two have been connected by a large copper cable. Our records show a total of eighty-one bonds, and as several have been in the ground fifteen years, an examination was made and they were generally found in a satisfactory condition.

The method used in determining the flow of current on the pipe is known as the "drop of potential" method, and the largest flow was found on the Jefferson Avenue 42 inch main. A complete list of these measurements is given in the following table:

Current Measurements

Date	Hour	LOCATION	Drop Over	Size and Kind	Millivolts			Di- rec tion	Approx. Amp.			REMARKS
					Min.	Max.	Ave.		Min.	Max.	Ave.	
June 8	12:15	Atwater and Orleans	43½ in.	Copper Cable 500,000 C. M.	0.6	0.8	0.7		8	10½	9⅓	Flow from Pipes
" 8	11:45	" " Chene	29 in.	Copper Cable 500,000 C. M.			4.8				96	" " "
May 20	2:00	Champlain and Concord	30 in.	42 in. C. I. Pipe			Trace	W.				West Line
June 8	10:50	" " Elmwood	41 in.	42 " "			0.2	W.			23	East Line
May 20	2:25	Congress and Meldrum	8 in.	42 " "			0.8	W.			466	West Line
June 8	10:30	" " McDougal	21 in.	42 " "			1.4	W.			311	West Line
" 8	9:40	" " St. Aubin	14 in.	36 in. C. I. Pipe			0.1	S.			26	North Line
" 8	3:55	Gratiot and Russell	23 in.	12 " "			0.15	W.			5	West Line
June 3	2:30	Harbaugh and Sire	12 in.	12 " "			Trace					North Line
June 8	2:15	Hastings and Congress	24 in.	24 in. C. I. Pipe			0.05	N.			4	South Line
" 8	2:25	" " Champlain	23 in.	24 " "			0.5	S.			40	South Line
May 19	3:05	Jefferson and Fisher	31 in.	42 in. C. I. Pipe			0.9	W.			135	West Line
" 19	2:20	" " VanDyke	11 in.	42 " "	0	0.2	0.1	W.	0	85	42½	West Line
" 19	2:00	" " Field	13 in.	42 " "			0.8	W.			287	West Line
" 19	11:30	" " St. Aubin	12 in.	6 in. C. I. Pipe	0.	1.1	0.9	S.	17	20	19	North Line
June 8	8:35	" " "	25 in.	10 in. C. I. Pipe	1.7	2.0	1.85	S.	33	39	36	" "
May 19	10:15	" " Riopelle	19 in.	12 in. W. I. Pipe	4.7	5.4	5.05	S.	805	925	865	Point "A" + to Point "B" Gas Company's permanent leads
July 1	8:50	" " M. C. R. R. between 10th & 12th	36 in.	42 in. C. I. Pipe	0.6	0.7	0.65	E.	78	91	85	Pipe exposed over tunnel
June 7	3:15	" " Campbell	20 in.	42 in. C. I. Pipe	0.2	0.8	0.4	W.	47	187	93	East Line
" 7	2:50	" " Waterman	21 in.	42 " "			0.2	W.			45	West Line
" 7	2:30	" " Solvay	21 in.	42 " "			0.1	E.			22	East Line
June 8	2:55	Orleans and Mullet	24 in.	24 in. C. I. Pipe			0.2	S.			15	South Line
" 8	3:30	" " "	18 in.	24 " "			0.1	S.			10	North Line
" 8	3:10	" " "	19 in.	30 in. C. I. Pipe			0.6	W.			82	West Line
June 26	4:30	Waterloo and Beaufait	36 in.	48 in. C. I. Pipe	0.6	0.7	0.65	W.	100	117	108	East of Sleeve
" 26	4:30	" " "	24 in.	48 " "	0.2	0.3	0.25	W.	50	75	63	West " "
June 9	8:55	Woodward and City Limit	16 in.	12 in. C. I. Pipe			0.7	N.			31	In meter well
" 9	8:55	" " " "	15 in.	6 in. W.I. Pipe			0.6	N.				Including 2 screwed jts.
" 9	8:55		22 in.	4 in. C. I. Pipe			1.0	N.				In meter well

Photographs and Microscopical Analysis.

The department has been equipped with an 8x10 camera and outfit, and photographs of construction work, some of which are shown in this annual report, are now made a part of the permanent records.

During the year thirty-seven microscopical analysis of the water have been made.

Emergency Station and Breaks in Mains.

An emergency crew of twelve men, divided into three watches of four men each, have been on duty night and day, and have operated gates and examined air and relief valves, as their duties required.

The two electric trucks provided for the emergency crew have been in constant service and have given good satisfaction.

The air chamber, with a capacity of 1,000 cubic feet, which is connected to the Jefferson Avenue and Champlain Street 42 inch force mains, has been in constant use.

There has been an entire absence of breaks in mains of a serious nature during the past year.

Intake Crib and Anchor Ice.

One man has at all times been located on the intake crib during the season of navigation. The crib was unoccupied from December 21st, 1908, to April 6th, 1909. Twice during the winter the lowering of the water in the settling basin seemed to indicate a partial stoppage by ice, but the water soon returned to its normal level without causing trouble or inconvenience.

EMERGENCY STATION, FISCHER AVENUE

EMERGENCY ELECTRIC TRUCK

Pipe in System Outside of Detroit.

Number of Feet of Pipe Laid and Discontinued during the following years.

Village	Size	1891 Laid	1892 Laid	1893 Laid	1894 Laid	1895 Laid	1896 Laid	1897 Laid	1899 Laid	1900-1 Laid	1901-2 Laid	1902-3 Laid	1903 Laid	1904 Disc.	1904-5 Laid	1905-6 Laid	1906 Laid	1907 Disc.	1907 & 1908 Laid	1907 & 1908 Disc.	1908 & 1909 Laid	1908 & 1909 Disc.	Total Laid	Total Dis.	Bal'nce now in System	Total each Village
Fairview (now Grosse Pointe)	6																259				795		1,054		1,054	
Park	8														4,689		2,027						6,716		6,716	7,770
St. Clair Heights	6			6.930		3,641									806		5,178	2,249	1.160				17,715	2,249	15;466	
"	8																7,491	278	969				8,460	278	8,182	
"	10																49						49		49	
"	12																3,813						3,813		3,813	27,510
Leesville	8						3,009																3,009		3,009	3,009
Hamtramck	4		3,541									7,442	6,034		1,330		2,401						20,748		20,748	
"	6	3,135			8,376			141	534			25,853	33,303		3,280	1,100			1,451		1,277		78,450		78,450	
"	8											4,964	6,712										11,676		11,676	
"	10											2,394											2,394		2,394	113,268
Highland Park	4							7															7		7	
"	6						18,137	508	3,395				6,005		3,742	10,486	6,632		15,073		13,744	20	77,722	20	77,702	
"	8							41	235				778						105				1,159		1,159	
"	10						3.457	700	75										357				4,589		4,589	
"	12						4,200	15															4,215		4,215	
"	16						815																815		815	88,487
State Fair Line	8														9,392								9,392		9,392	9,392
River Rouge	4									7,031	651		3,340								36	40	11,058	40	11.018	
" "	6									19,595	25	1,395	2,375	1.782	11,782						6,403	59	41,575	1,840	39,734	
" "	8									7,410													7,410		7,410	58,162
Ecorse	4												2,044							104			2,044	101	1,943	
"	6												11,671				425		3,345		104		15,545		15.545	
"	8												9,170										7,170		9,170	26,658
Total		3,135	3,541	6,930	8,376	3,541	29.618	1,412	4,239	34,036	676	42,048	81,432	1,782	35,021	11.586	28,275	2,527	22,460	101	22,359	119	338,785	4 529	334,256	334,256

* 18 Months

2,330 ft. of 4 in.
10,872 ft. of 6 in. } 13,463 ft. of Pipe in all, formerly included in above table under Lasalle Gardens have been added to City System.
261 ft. of 8 in.

63 miles, 1,616 feet.

Engineering and Superintendence.

As evidence of the large amount of work done during 1908-9, it appears that the average cost of construction for the years 1905-6, 1906-7 and 1907-8 was $398,313.30; while for the past year it was $821,402.30, an increase of about 106 per centum. As further indication of the comparative amount of work done, an average of about 3,626 tons of pipe per year was laid during the three previous years mentioned above, while about 14,225 tons, or four times as much, were laid during the past year.

Most of the year a pipe inspector has been located at Birmingham, Alabama; and for six months a valve inspector at Elmira, New York.

All pipe, valves and corporation cocks are rigidly inspected, and all bronze castings are made according to a standard composition.

A regular quarterly inspection is made of all the 186 private fire plants and the 33 hydraulic elevators.

There have been received 146 complaints of bad water, and 69 flushings have been made to remedy the trouble.

The Civil Engineer submitted a report as to the condition of the present ten inch pipe line which supplies Belle Isle, with estimates of the cost of constructing another main twelve inches in diameter, and a recommendation that the new line should cross the Detroit river at the Water Works park. On request of the Department of Parks and Boulevards, this line was ordered laid by the Board, May 25th, 1909.

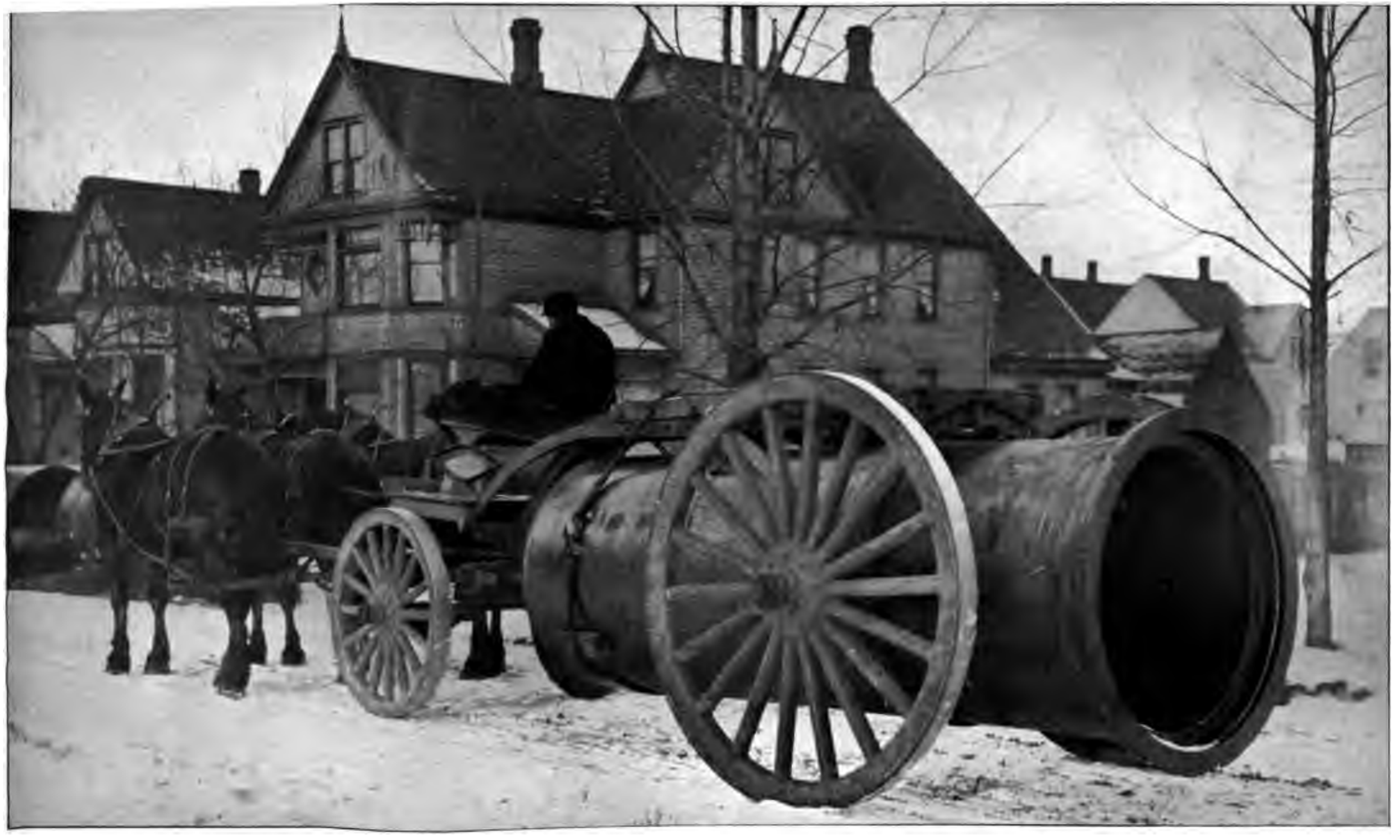
The work in the offices of the civil engineering and the construction departments has been carried on in a highly efficient and satisfactory manner.

Shut-off Gate System, June 30, 1909.

KIND OF GATE	48-in.	42-in.	36-in.	30-in.	24-in.	20-in.	18-in.	16-in.	12-in.	10-in.	8-in.	6-in.	4-in.	3-in.	Total
Murdock	....	4	....	10	14	....	....	26	36	179	449	1,572	1,015	6	3,311
Michigan Brass and Iron Works, and S. S. and Valves	....	9	....	9	2	9	....	11	25	65	179	752	99	....	1,160
Detroit Water Works	8	27	5	3	4	....	....	14	80	142	349	1,108	270	....	2,010
Flowers	....	16	......	8	10	1	....	....	2	36	55	243	306	15	692
Galvin	....	....	1	7	12	....	....	28	....	10	26	136	160	....	375
Prong	....	....	....	....	26	....	2	2	....	8	14	31	137	....	220
Eddy	....	....	....	....	....	....	....	...	....	3	3	5	9	....	20
Scott	....	....	....	....	....	....	....	....	6	2	19	78	49	......	154
Ludlow	....	....	....	....	....	....	...	....	....	1	1	5	2	....	9
St. Louis	....	....	....	....	....	....	....	......	1	....	....	....	....	....	1
Boston	....	....	......	....	....	....	....	....	....	....	....	1	....	....	1
Newport	....	....	....	....	......	....	....	....	....	....	....	....	1	....	1
Total	8	56	6	37	68	10	2	76	150	446	1,095	3,931	2,048	21	7,954

Pipe laid from July 1st, 1908, to July 1st, 1909—continued.

Date	LOCATION	Feet	Size	COST OF CONSTRUCTION										
				Pipe	Specials	Lead	Gates	Misc.	Wells	Cartage	Outside Bills	Sup. & Eng.	Labor	Total Cost
June 28	**Alfred** from St. Antoine to Beaubien	506	8-in.	265 29	25 88	26 70	43 30	20 72	44 42	46 77	....	23 42	463 86	960 36
June 18	**Ash** from Wabash east	160	6-in.	59 96	1 10	6 68	12 93	8 88	22 07	8 70	....	6 43	136 84	263 59
May 20	**Alger** from Russell west	124	6-in.	46 30	6 05	5 21	23 17	92	20 04	3 71	....	3 48	33 97	142 85
May 15	**Alexandrine** crossing Beaubien	20	8-in.	8 99	1 98	3 12	19 75	22	20 04	1 50	....	2 90	60 46	118 96
Jan. 2	**Artillery** from Army to Dix	2,130	16-in.	3,525 44	39 85	231 82	162 72	74 46	119 33	146 00	....	160 01	2,100 71	6,560 34
Jan. 9	**Anchor** South of Burke, also **Brownlee** from Cicotte east (R. Rouge)	372	6-in.	157 68	16 47	17 84	14 22	2 07	....	13 56	....	10 27	192 47	424 58*
Dec. 16	**Abbot** from Jefferson south (R. Rouge)	464	6-in.	198 17	10 19	15 58	25 48	5 22	21 92	16 37	...	11 18	154 32	458 43*
Oct. 26	**Agnes** from Boulevard to Townsend	1,056	10-in.	778 47	46 33	63 08	160 60	20 09	102 42	18 05	....	44 72	719 57	1,899 33
Sept. 21	**Alter Road** north of Jefferson	2,583	6-in.	1,007 87	23 66	76 06	12 93	4 46	18 17	47 44	....	48 68	757 79	1,997 06
Aug. 15	**Adelaide** from Beaubien to St. Antoine	508	10-in.	376 15	22 62	25 97	53 30	27 64	Rep'rs 14 15	18 73	D.P.W. 77 17	24 35	446 43	1,086 51
July 21	**Adams** alley north of, from Clifford to Woodward	898	8 in.	473 95	141 73	67 47	103 20	50 55	76 69	41 78	D.P.W. 472 32	57 84	1,098 03	2,583 56



HAULING 48 IN. PIPE

July	31	**Adelaide** from Rivard west	404	10-in.	296 13	25 67	30 36	32 35	17 57	14 59	25 44	D.P.W. 376 17	31 12	563 63	1,413 03
July	10	**Adelaide** from Riopelle to Orleans	450	8-in.	241 89	31 65	25 30	39 90	11 36	42 65	16 60	D.P.W. 21 03	18 73	340 37	789 48
Mar.	6	**Bewick** east side, from Jefferson to Kercheval, also **Kercheval** crossing Bewick	1,268 92 77	48-in. 48-in. 16-in.	.... 12,678 13	.... 1,549 52	.... 660 07	.... 1,171 93	L'm'br 30 60 S'dries 82 53	..... 511 57 Piers 274 05	.... 745 86	....	... 680 69	.... 9,524 89	..... 27,909 84
Oct.	1	**Bewick** west side, from Jefferson to Kercheval	 1,176	.... 48-in.	.... 11,267 99	.... 1 28	.... 589 85	....	L'm'br 97 65 S'dries 52 37	....	.... 809 80	....	.... 488 60	6,745 20	...... 20,052 14
Feb.	5	**Bewick** west side, crossing Kercheval	49	48-in.	469 50	....	24 30	......	2 32	....	23 02	....	21 12	325 81	866 07
July	1	**Beals** south of Charlevoix	775	6-in.	292 22	5 50	27 59	12 93	1 43	19 30	11 29	....	15 48	248 47	634 21
May	28	**Boulevard N.** north side, from John R. west, also **John R.** crossing Boulevard	251 34	6-in. 8-in.	.... 111 31	... 4 73	.... 12 91	.... 42 92	.... 3 43	.... 41 34	.... 10 80	....	.... 10 05	.... 174 49	...... 411 98
May	29	**Boulevard N.** from Richmond east	187	6-in.	69 83	11 72	9 79	23 17	2 20	20 04	1 38	....	5 91	98 28	242 32
May	29	**Boulevard E.** north of Waterloo	104	6-in.	37 95	5 50	3 65	....	43	....	2 79	....	2 67	56 50	109 49
May	24	**Blackstone** from Elsemere east, also **Elsemere**, from Krupp to Blackstone	689	6-in.	261 10	1 41	23 36	12 93	4 46	20 54	17 71	......	13 39	194 36	549 26
May	25	**Boulevard N.** from Mt Elliott east	171	6-in.	62 62	9 21	6 23	12 93	97	20 36	3 62	....	4 81	76 40	197 15
May	11	**Boulevard W** crossing Nall	122	6-in.	46 12	....	4 45	12 93	2 28	21 47	3 82	....	3 78	58 93	153 83
Apr.	20	**Beaubien** crossing Boulevard, also crossing Horton	57 18	12-in. 6-in.	53 75	35 62	22 25	3 80	29 97	25 90	10 68	D.P.W. 64 60	12 61	317 04	576 22

Pipe laid from July 1st, 1908, to July 1st, 1909—continued.

Date	LOCATION	Feet	Size	COST OF CONSTRUCTION										
				Pipe	Specials	Lead	Gates	Misc.	Wells	Cartage	Outside Bills	Sup. & Eng.	Labor	Total Cost
Apr. 14	**Boulevard N.** east of Greenwood	190	6-in.	71 73	5 50	6 68	....	86	....	3 07	....	4 79	103 56	196 19
Apr. 10	**Boulevard N.** from Fifteenth east	257	6-in.	96 59	9 44	10 68	12 93	1 08	20 47	8 15	.. .	6 76	111 49	277 59
Dec. 28	**Boulevard N.** from Cass west	280	6-in.	108 90	11 62	10 10	10 24	1 86	....	8 84	....	8 34	183 92	343 82
Nov. 28	**Beaufait** from Medbury to Holburn, **also Holburn** from Beaufait west	267 120	8-in. 6-in.	192 25	4 19	16 20	19 95	1 57	20 49	8 22	....	10 92	173 88	447 67
Nov. 20	**Beaubien** from Owen to Westminster, also **Owen** from Beaubien east and west	1,052 422	8-in. 6-in.	734 10	46 09	63 08	72 78	7 79	100 95	23 91	D.P.W. 9 95	39 44	528 84	1,626 93
Nov. 24	**Beaubien** from Boulevard to Horton, also **Horton** from Beaubien east	620	12-in.	584 95	27 74	49 78	72 20	23 16	25 68	35 71	D.P.W. 64 60	36 38	638 20	1,558 40
Nov. 20	**Boulevard E.** north of Sylvester	556	6-in.	217 00	6 35	14 84	....	1 29	....	8 45	....	11 50	212 15	471 58
Nov. 14	**Belmont** from Beaubien east and west	620	6-in.	241 69	6 35	18 55	23 17	90	20 28	8 99	....	13 35	214 26	547 54
Nov. 5	**Boulevard N.** from Greenwood east	483	6-in.	187 63	19 77	16 70	10 24	2 52	20 17	4 44	....	14 05	300 53	576 05
Nov. 1	**Boulevard N.** from Fourteenth west	6 287	8-in. 6-in.	113 35	13 30	7 42	43 12	2 78	26 81	9 32	....	10 69	211 31	438 10
Oct. 21	**Beard** from Lisbon north	104	6-in.	39 95	5 50	3 71	....	33	....	1 38	....	1 82	21 97	74 66

Sept. 25	**Boulevard W.** north of Cobb	187	6-in.	72 07	5 50	7 42	....	85	....	4 84	....	4 35	82 19	177 22
Oct. 6	**Batavia** and **Burke** (River Rouge)	9	6-in.	1 51	10 86	2 99	....	44	....	3 55	....	69	8 26	28 30*
Oct. 5	**Boulevard N.** from Third west	156	6-in.	59 93	5 50	7 42	....	85	....	3 93	....	4 04	73 98	155 65
Sept. 2	**Broadway** alley west of. from John R. to Wilcox	398	8-in.	216 23	33 46	38 96	57 60	73 57	54 27 Rep'rs 3 86	12 50	D.P.W. 121 15	28 14	529 53	1,169 27
Sept. 5	**Beaumont** from Peterson to Pulaski	834	10-in	617 69	59 65	55 66	72 20	4 95	41 13	32 19	....	27 25	206 75	1,117 47
Aug. 28	**Beard** north of Army	66	6-in.	25 85	....	2 49	....	11	....	1 72	....	1 37	24 62	56 16
Sept. 5	**Burke** crossing James (River Rouge)	15	6-in.	2 36	9 46	3 39	....	09	....	1 78	....	63	8 00	25 71*
July 9	**Boulevard E.** north of Waterloo	74	6-in.	28 99	....	3 74	....	09	....	1 38	....	1 61	30 07	65 88
Aug. 13	**Beaubien** from Madison to Elizabeth	871 17	10-in. 8-in.	645 07	65 37	44 53	129 95	16 83	137 05	60 55	D.P.W. 57 00	51 41	957 31	2,165 07
July 23	**Boulevard W.** from McGraw north	293	6-in.	112 03	9 84	10 12	23 03	7 43	20 49	6 50	....	7 27	101 37	298 08
July 10	**Belmont** from John R. east and west	871	6-in.	339 61	12 78	29 04	12 93	4 14	20 05	16 29	..	17 01	245 67	697 52
July 31	**Beech** from First to Fifth	1.530	8-in.	827 22	42 88	71 50	139 65	77 56	146 22	69 48	D.P.W. 30 89	66 56	1,287 62	2,759 58
June 30	**Central** from Michigan north	39 975	12-in. 10-in.	734 63	19 10	55 40	46 34	7 43	20 36	27 81	....	33 36	423 23	1,367 66
May 19	**Cameron** from Caniff south	278	6-in.	104 36	10 41	11 13	23 17	1 55	20 04	9 56	....	7 12	104 71	292 05
May 18	**Canton** north of Waterloo	152	6-in.	55 41	5 50	5 34	....	88	....	2 70	....	3 05	52 07	124 95

Pipe Laid Inside The City From July 1st, 1907, to July 1st, 1908.

Date.	LOCATION	Feet	Size	COST OF CONSTRUCTION										
				Pipe	Specials	Lead	Gates	Misc.	Wells	Cartage	Outside Bills	Sup. & Eng.	Labor	Total Cost
Apr. 30	**Casgrain** from Fort north	665	6-in.	251 61	14 39	24 03	23 17	2 71	19 41	9 41	D.P.W. 9 21	13 20	183 29	550 43
Apr. 23	**Crane** from Gratiot south	517	6-in.	194 68	8 15	15 58	10 24	1 58	20 04	8 58	....	10 95	179 12	448 92
Apr. 23	**Cartridge** from Artillery west	329	6-in.	124 10	3 06	10 32	10 24	72	....	5 83	......	5 76	75 14	235 17
Apr. 12	**Canfield** from Mt. Elliott west, also crossing Mt. Elliott	419 46	8-in. 6-in.	235 93	35 94	27 37	32 68	27 17	40 86	14 45	....	18 17	326 39	758 96
Jan. 2	**Cartridge** crossing Artillery	24	6-in.	9 21	5 24	1 60	12 93	39	19 54	3 75	....	1 55	9 26	63 47
Dec. 30	**Canton** north of Waterloo	404	6-in.	158 06	5 50	12 15	....	1 00	....	8 15	....	6 98	95 72	287 56
Oct. 16	**California** from Oakland west (Highland Park)	2,434	6-in.	1,044 52	42 01	85 76	71 10	5 77	42 23	39 20	......	53 85	831 47	2,215 91‡
Oct. 26	**Cottage Grove** from John R. east (Highland Park)	855	6-in.	366 41	7 80	30 63	14 22	2 92	21 33	21 06	....	19 46	313 99	797 82‡
Nov. 20	**Cooper** north of Canfield	146	6-in.	57 18	....	5 43	....	18	....	2 75	...	2 27	25 39	93 20
Nov 20	**Canfield** east of Cooper	99	6-in.	38 18	85	3 62	....	18	....	2 75	....	1 76	24 67	72 01
Nov. 25	**Charlevoix** from Beals to Seyburn	244	8-in.	131 59	23 13	11 13	19 95	1 40	20 17	8 17	....	8 29	115 60	339 43
Oct. 9	**Cadillac** from Mack south	3,320	6-in.	1,295 78	46 59	107 60	51 72	106 67	80 82	40 54	D.P.W. 82 47	87 48	1,809 98	3,709 65

Oct.	19	**Cadillac** from Chapin to Shoemaker, also **Shoemaker** from Cadillac to McClellan	2,157	12-in.	2,040 69	52 58	66 79	72 20	11 71	44 07	42 44	....	90 20	1,279 67	3,700 35
Oct.	6	**Champlain** from Van Dyke to Shipherd	403	6-in-	154 73	14 99	11 13	....	68 74	....	16 62	....	17 57	443 45	727 23
Oct.	14	**Crane** north of Forest	283	6-in.	110 46	5 50	9 28	....	89	....	7 62	....	5 67	93 39	232 81
Sept.	28	**Chapin** from Holcomb to McClellan	46 648	6-in. 8-in.	369 11	16 37	33 36	39 90	2 45	40 34	8 77	....	18 78	240 99	770 07
Sept.	23	**Coplin** north of Jefferson	458	6-in.	178 62	5 50	14 84	....	1 64	....	11 11	....	8 49	127 71	347 91
Sept.	17	**Charles** crossing Riopelle (River Rouge)	10	4-in.	51	6 24	1 99	....	05	....	1 08	....	47	8 97	19 31*
Sept.	18	**Cicotte** crossing Burke (River Rouge)	8	6-in.	....	12 06	2 39	....	06	....	1 08	....	61	8 97	25 17*
Aug.	20	**Collingwood** west of Third	310	6-in.	120 65	....	9 28	....	6 98	....	6 58	....	5 94	94 20	243 63
July	11	**Cardoni** from Alger north	315	6-in.	122 61	4 30	12 44	12 93	1 54	20 01	4 59	....	6 88	96 63	281 93
Aug.	5	**Cooper** north of Buhl	110	6-in.	43 09	......	3 85	......	44	....	5 05	....	2 68	54 95	110 06
Apr.	8	**Dexter** from Boulevard north, and crossing Boulevard	9 58 316	6-in. 12-in. 10-in.	278 70	29 70	39 92	23 17 S.S.&V. 89 00	3 74	42 13	14 56	D.P.W. 5 50	20 65	304 88	851 95
Dec.	7	**Dix** from M. C. R. R. west	95	16-in.	134 70	12 35	10 01	10 24	92	....	10 25	....	6 67	88 21	273 35
Dec.	6	**Dix** crossing Artillery	32	10-in.	21 69	6 25	4 45	....	31	....	2 00	....	1 50	25 38	61 58
Dec.	26	**Dix** from Artillery to M. C. R. R., also **Artillery** crossing Dix	1,057	16 in.	1,737 75	100 19	104 13	302 92	33 62	264 29	71 00	Doct'rs Bill 23 00	89 09	949 29	3,675 28

Pipe laid from July 1st, 1907, to July 1st, 1908—continued.

Date	LOCATION	Feet	Size	COST OF CONSTRUCTION										
				Pipe	Spec-ials	Lead	Gates	Misc.	Wells	Cart-age	Out-side Bills	Sup. & Eng.	Labor	Total Cost
Jan. 12	**Davison** from Second west (H. Park)........	1,350	6-in.	579 88	20 32	49 05	28 44	3 48	....	77 50	....	31 60	505 26	1,295 53‡
Dec. 17	**Duncan** from Maxwell east..................	124	6-in.	47 99	8 87	5 34	10 24	1 04	....	8 01	....	3 39	54 28	139 16
Oct. 23	**Driggs** from Junction to Campbell........	596	8-in.	324 88	9 02	22 62	39 90	14 16	46 56	12 78	....	15 65	160 45	646 02
Oct. 5	**Delisle** and Burke (River Rouge)..........	8	6-in.	2 15	10 87	2 99	....	67	......	3 55	....	65	5 81	26 69*
Sept. 17	**Division crossing** Riopelle (River Rouge)..............	10	4-in	51	....	1 99	....	6 29	....	2 15	....	50	9 27	20 71*
July 6	**Division** from Orleans to St. Aubin.........	7 1019	6-in. 8-in.	552 03	46 30	52 96	25 86	36 30	22 54	43 15	D.P.W. 10 20	36 67	694 76	1,520 77
Nov. 11	**Ellery** from Arndt to Charlevoix, also **Charlevoix** from Ellery to Mt. Elliott..............................	262 743	6-in. 8-in.	504 26	28 12	40 82	39 90	13 85	40 78	10 28	D.P.W. 11 76	27 50	422 89	1,140 16
Jan. 5	**Field** from Lambert south................	286	6-in.	110 85	6 35	12 15	23 17	1 24	19 97	11 24	....	8 27	145 97	339 21
Nov. 23	**Florian** from Jos. Campau to Whitney (Hamtramck).	873	6-in.	374 81	71 40	30 06	42 66	2 93	40 92	24 75	....	20 05	276 36	883 94§
Dec. 11	**Fisher** south of Gratiot....................	691	6-in.	269 89	6 35	20 26	....	1 74	....	9 48	....	13 68	237 33	558 68
Nov. 3	**Ford** from Woodward to Hamilton (Highland Park)....................	2,654	6-in.	1,137 35	58 68	98 01	82 36	16 90	43 05	41 25	....	60 04	923 19	2,460 83‡

Nov. 14	**Ferry** from Concord to Helen............	583	8-in.	314 51	36 64	29 68	39 90	8 49	40 02	10 28	....	23 68	451 53	954 73
Oct. 6	**Fifth** from Fort to alley north of Lafayette..........................	566	8-in.	301 40	29 37	24 12	56 63	14 65	39 74 Repa'rs 1 67	45 83	D.P.W. 77 03	28 85	640 46	1,250 75
Oct. 13	**Fisher** south of Charlevoix...............	183	6-in.	71 29	6 76	3 71	....	1 11	....	3 78	....	3 73	63 82	153 70
Sept. 1	**Forest** from St. Antoine to Hastings	615	10-in.	453 43	31 41	44 52	53 30	63 96	40 76	15 06	D.P.W. 125 42	38 40	835 40	1,701 66
Aug. 20	**Forest** from Dubois west	858	10-in.	626 66	54 48	63 08	90 05	115 59	62 90	46 41	D.P.W. 52 83	80 73	1,305 11	2,497 84
May 19	**Grand River** alley east of, through site of Newcomb, Endicott Bldg., also alley east of Woodward from Grand River south.....			Old Pipe,	Lead,	and Ga	te dedu	cted fro	m this	cost				
		181	8-in.	75 05	18 27	12 89	21 73	1 93	48 15	8 01	....	1	114 83	309 67
Apr. 24	**Goodwin** from Westminster north...........	712	6-in.	269 64	3 48	21 81	12 93	1 90	21 75	12 74	....	13 98	213 24	571 42
Dec. 29	**Great Lakes** from Jefferson north (River Rouge)	451	6-in.	193 01	6 74	17 84	36 56	3 24	23 75	14 88	....	10 64	133 44	439 55*
Dec. 22	**Goodwin** south of Caniff....................	461	6-in.	179 79	6 35	14 15	....	1 51	....	10 82	....	10 04	189 10	411 76
Oct, 16	**Goodwin** south of Caniff.............	91	6-in.	35 25	...	3 26	....	07	...	3 42	....	1 70	25 97	69 67
Aug. 19	**Goodwin** from Caniff south	124	6-in.	47 40	6 79	9 28	23 03	1 27	19 85	7 01	....	4 31	57 59	176 53
May 1	**Holcomb, Lorman, Crane** and **Waterloo** north from Kercheval and from Holcomb west, also **Burns** crossing Waterloo and **Van Dyke** crossing Waterloo, also **Field** crossing Waterloo.................	7,217 24 22 551 623	48-in. 12-in. 10-in. 8-in. 6-in	69,295 63	1,365 73	3,691 45	3,390 06	455 13 C'ment 79 25 Sand 32 87 Lumb'r 685 41	1,802 31 repairs 106 05	Mat'ri l 1,773 55 Dirt 1,184 00	D.P.W. 162 74 Supp'rs 2 50 Gas Co. 30 45 Rep.gls 79	2,867 85	30858 92	117784 69

Pipe Laid Inside the City From July 1st, 1908, to July 1st, 1909.

Date	LOCATION	Feet	Size	COST OF CONSTRUCTION										
				Pipe	Spec-ials	Lead	Gates	Misc.	Gates	Cart-age	Out-side Bills	Sup. & Eng.	Labor	Total Cost
June 4	**Harper** alley south of, from Hastings west	251	6-in.	95 63	11 23	11 79	12 93	2 65	19 88	4 39	....	7 26	131 76	207 52
June 9	**Holcomb** from Mack north..................	792	6-in.	299 05	13 06	24 92	23 17	2 22	20 04	15 08	....	14 97	201 29	613 80
June 4	**Holcomb** from Harper north (Hamtramck`.	404	6-in.	166 98	8 28	15 93	25 48	1 70	21 27	13 13	....	10 41	168 78	428 96‡
Apr. 16	**Hurlbut** north of Kercheval................	601	6-in.	227 32	5 50	18 25	12 93	1 71	....	6 21	....	11 69	195 62	479 23
May 4	**Harper** alley south of, east of St. Antoine.	195	6-in.	72 86	7 17	6 67	....	61	....	6 39	...	5 03	107 65	206 38
Apr. 23	**Holcomb** from Chapin south......	170	6-in.	63 38	4 92	5 34	23 17	94	20 04	1 64	....	4 68	67 67	191 78
Apr. 1	**Hubbard** north of Brandon	106		39 47	85	3 56	....	38	....	3 39	....	1 91	28 80	78 36
Apr. 6	**Harper** crossing Chene..............................	66	6-in.	23 91	5 47	5 47	25 86	2 98	40 34	3 00	...	5 88	128 24	241 15
Apr. 5	**Harper** from Dubois east..........	208	8-in.	109 24	1 51	10 15	19 75	2 41	15 68	8 43	..:.	8 58	177 70	353 45
Jan. 2	**Henry** from Jefferson to Division (River Rouge)..........	673	6-in.	288 65	12 29	26 75	28 44	2 74	45 74	22 17	....	15 18	178 51	620 47*
Feb. 8	**Hurlbut** from Pumping Station to Kercheval, also **Pumping Station Grounds**	2,071	42-in.	15.518 77	2,848 51	893 83	4,313 07	167 33 Lumb'r 173 23 Cement 142 25 Venturi 1,980 00	2,175 99 Piers 212 93	Mat'ri'l 414 82 Dirt 367 50	D. P. W. 604 55	1,029 34	11943 56	42,810 68

Dec. 25	**Hartford** from Tireman south, also **Tireman** crossing Hartford	149 37	6-in. 16-in.	109 75	16 36	12 15	23 17	1 85	20 10	6 01	....	7 29	126 87	324 18
Oct. 15	**Hurlbut** north of Bingham	194	6-in.	75 21	85	5 05	...	18	....	1 57	....	3 70	65 19	151 75
Nov. 30	**Hamilton** north of Waterloo	111	8-in.	59 79	....	5 34	....	28	....	1 75	....	2 37	27 63	97 16
Nov. 14	**Hartford** from McGraw north	450	6-in.	175 32	13 12	16 70	23 17	1 17	29 17	7 85	....	10 08	164 36	431 94
Oct. 16	**Helen** north of Waterloo	147	6-in.	57 19	....	8 70	....	31	....	1 73	....	3 34	70 67	136 94
Oct. 20	**Hillger** north of Kercheval	281	6-in.	109 68	5 50	7 60	....	67	....	4 14	....	5 37	88 00	220 96
Oct. 9	**Henry** and Genesee (River Rouge)	8	6-in.	....	12 06	2 99	....	20	....	1 75	....	55	4 84	22 39*
Oct. 7	**Holcomb** from Kolb north	410	6-in.	159 81	9 05	11 13	....	1 67	....	7 58	......	7 82	123 44	320 50
Sept. 25	**Hart** north of Kercheval	824	6-in.	320 42	11 78	25 97	....	2 81	....	6 24	....	16 10	276 92	660 24
Aug. 24	**Helen** south of Gratiot	424	6-in.	164 52	9 05	16 70	....	1 34	....	6 99	....	7 56	103 92	310 08
Aug. 26	**Herbert** from Livernois west	367	6 in.	142 97	12 52	13 58	23 03	4 13	22 24	10 80	....	8 12	95 52	333 00
Aug. 24	**Herbert** from Twenty-eighth to Thirty-first	798	8-in.	482 99	28 25	37 33	39 90	3 81	44 16	9 35	....	21 09	247 93	864 81
July 31	**Hancock** from Boulevard east, also **Boulevard from Hancock north**	473	6-in.	182 93	12 20	20 36	12 93	6 06	19 65	11 99	D.P.W. 10 47	11 57	196 68	484 84
Aug. 5	**Helen** north of Waterloo	72	6-in.	28 20	....	2 72	....	10	....	3 04	....	1 75	35 85	71 66

Pipe laid from July 1st, 1908 to July 1st, 1909—continued

Date	LOCATION	Feet	Size	COST OF CONSTRUCTION										
				Pipe	Specials	Lead	Gates	Misc.	Gates	Cartage	Outside Bills	Sup. & Eng.	Labor	Total Cost
July 14	**Jay** from Jos. Campau to Chene, also connection at Jay and Chene......	985 1,010 58	48-in. 8-in. 36-in.	10,035 16	791 04	552 47	1 664 10	180 04 Lumbr 34 11 Cement 100 00 Sand 23 80	1,009 15 Piers 158 00 Repa'rs 11 76	Mat'ri'l 278 83 Dirt 638 00	D. P.W. 531 87	565 47	7,142 16	23,715 96
	Jerome north of Jefferson............	121	6-in.	46 61	85	4 05	....	24	....	4 98	....	2 28	34 44	98 45
Aug. 25	**Jefferson** from Artillery to Solvay and cross connections........................	3,785 12 13 36	42-in. 16-in. 10-in. 8-in.	28,793 44	984 45	1,061 04	2,113 83	Cement 440 69 Sand 20 25 Lumb'r 203 77 Misc. 81 74	791 28 Rep. Cond. 289 83 Repairs 58 59	Mat'ri'l 862 04 Dirt 277 00	D. P.W 2,774 88	1,270 03	11499 04	52071 40
Sept. 18	**James** crossing Brownlee (River Rouge)..........	10	6-in.	86	....	3 19	....	12 14	....	2 15	....	69	9 27	28 30*
July 8	**Jefferson** alley north of, from Parker west..	148	6-in.	56 80	14 52	7 41	10 10	2 01	....	8 94	....	4 78	91 41	195 97
Aug. 4	**Jameson** from McClellan east..	574	6-in.	223 67	7 18	20 24	23 03	7 85	20 17	8 59	......	12 88	204 54	528 15
Aug. 3	**Josephine** crossing Jefferson (Ecorse).................	51	6-in.	21 44	8 31	6 13	14 22	2 92	28 00	6 97	....	3 13	42 29	128 41*
Oct. 22	**Kercheval** from Bewick to Hurlbut...........	206	48-in.	1,973 81	2 00	96 92	......	87 07	28 51	161 70	D. P.W. 90 32	94 80	1,560 43	4,045 56

June 16	**Kercheval** from Hillger east..................	214	16 in.	299 12	32 45	28 03	25 86	7 15	20 04	16 93	....	19 04	332 02	780 64
May 4	**Kercheval** from Holcomb east, also **Holcomb** crossing Kercheval, also **Kercheval** from Pennsylvania to Park View, also **Belvidere** from Kercheval north	1,520 306 325	48-in. 8-in. 12-in.	14,800 67	668 21	657 54	85 13	59 07 Sand 10 80 Sand 33 29 Cement 155 00	107 69 Piers 51 99	Mat'ri'l 417 18 Dirt 354 00	D. P. W. 896 65	635 23	8,294 80	27,227 25
Apr. 9	**Kercheval** crossing Hurlbut, also connection at Hurlbut and Kercheval.....	87 22	48-in. 42-in.	889 40	499 23	80 99	......	26 58 Cement 29 50	Rep'irs 27 96 Piers 19 51	50 41	Gas Co. 8 66	76 63	1,449 71	3,158 58
Dec. 10	**Kercheval** from Hurlbut west.................	464	48-in.	4,282 99	459 08	265 31	1,072 34	45 20	637 84	326 98	....	266 58	3,654 31	11,010 63
Dec. 10	**Kercheval** crossing Cadillac...............	51	42-in.	240 37	505 80	97 90	910 24	29 35	439 22	80 60	....	75 98	719 62	3,099 08
Dec. 7	**Kercheval** from Defer Place to Beniteau, also **Defer Place** crossing Kercheval....	201 64	16-in. 6-in.	326 05	24 16	28 35	12 93	6 14	20 10	15 15	....	19 33	340 50	792 71
Nov. 17	**Kirby** from Concord to Bellevue..........	375	6-in.	146 49	5 50	11 13	12 93	1 88	19 85	3 60	...	9 68	185 62	396 68
Oct. 21	**Krupp** west of Elsemere..................	166	6-in.	63 46	7 27	5 57	....	46	....	8 09	....	3 08	38 56	126 49
Aug. 4	**King** from Oakland west.................	367	6-in.	143 37	3 55	10 86	....	72	....	7 51	......	7 01	114 38	287 40
May 17	**Lake Point** from Jefferson north (Grosse Pointe Park.........................	795	6-in.	330 62	5 36	28 18	36 56	27 16	22 62	35 13	....	26 50	578 33	1,090 56
June 3	**Lothrop** alley south of, crossing Linwood..	44	6-in.	15 94	23 21	5 47	....	55	76 08	1 93	....	4 87	71 77	199 82
May 26	**Lessing** east of McClellan	65	6-in.	23 53	7 79	2 89	....	31	....	1 38	....	1 89	40 07	77 86

Pipe Laid Inside the City From July 1st, 1908, to July 1st, 1909.

Date	LOCATION	Feet	Size	COST OF CONSTRUCTION										
				Pipe	Specials	Lead	Gates	Misc.	Wells	Cartage	Outside Bills	Sup. & Eng.	Labor	Total Cost
May 15	**Lawrence** from Third east	195	6-in.	73 24	84	6 68	12 93	1 42	21 79	5 42	....	5 14	79 69	207 15
May 19	**Leicester Court** west of Oakland	62	6-in.	22 97	84	2 23	....	10	....	1 86	....	1 16	18 59	47 75
Jan. 5	**Linden** from Jefferson to Division (River Rouge)	618	6-in.	264 95	10 71	24 55	14 22	2 33	22 87	19 82	....	12 60	148 25	520 30*
Dec. 14	**Leblanc** from Genevieve south, also **Genevieve** from LeBlanc to Elizabeth (River Rouge)	491	6-in.	209 81	16 40	17 84	14 22	6 26	21 35	8 47	....	10 74	135 32	440 41*
Dec. 3	**Lewis** from Jefferson to Burke (River Rouge)	365	6-in.	155 09	17 40	18 96	25 48	6 93	43 35	12 90	....	10 89	155 36	446 36*
Nov. 26	**Lambert** from Baldwin to Townsend, also **Townsend** from Lambert north	561	6-in.	218 57	9 94	18 55	23 17	2 14	20 17	8 68	....	12 27	188 23	501 72
Nov. 16	**Lane** west of Springwells	364	6-in.	142 58	....	11 31	....	1 24	....	7 03	......	6 29	89 57	258 02
Nov. 9	**Larchmont** from Grand River west	550	6-in.	213 87	9 98	16 70	23 17	1 67	20 17	7 81	....	13 11	231 22	537 70
Oct. 9	**Leroy** and **Genesee** (River Rouge)	8	4-in.	38	6 24	2 49	....	10	....	1 75	....	40	4 40	15 76*
Sept. 1	**Lauderdale** from Junction west	314	6-in.	122 21	6 28	12 44	12 93	13 51	21 92	4 49	....	8 46	144 77	347 01

Aug. 28	**Lewerenz** from Regular south, also **Regular** from Waterman to Lewerenz.....	461	6-in.	179 79	19 91	21 49	25 86	1 42	42 80	8 72	....	9 85	95 46	405 30
Aug. 15	**Lockwood** from Rollin south..................	111	6-in.	78 34	2 21	4 53	10 10	4 01	....	3 68	...	3 19	24 88	130 94
June 14	**Michigan** from Larkins to Central, also crossing Central..................	16 42 2,016	8-in. 12-in. 24-in.	4,990 34	137 81	368 73	623 00	163 42	420 96	836 45	D.P.W. 1,279 77	237 62	8,884 13	12,478 23
June 23	**Michigan** west of Lumley....................	36	24-in.	89 01	....	4 45	....	2 54	......	5 00	....	6 59	162 45	270 04
June 30	**Medbury** alley south of, from Brush west...	319	6 in.	119 92	1 94	11 13	....	1 01	21 47	5 04	....	6 73	108 76	276 00
June 4	**Military** crossing Southern..........................	49	8-in.	24 86	....	2 23	12 93	2 75	....	2 00	.....	2 00	35 23	82 00
June 26	**Montclair** from Kercheval north and south..	1,147	6-in.	433 39	24 10	44 06	25 86	10 23	41 34	16 17	....	26 96	483 18	1,105 29
May 19	**McDougall** from Kirby north..................	101	6-in.	37 57	11 43	4 45	10 24	67	....	1 32	....	2 62	39 34	107 64
May 10	**Medbury** from Hastings east................	617	6-in.	233 01	12 96	23 50	12 93	6 47	18 99	7 69	....	16 27	335 16	666 98
Apr. 25	**May** north of Gratiot....................	114	6-in.	42 12	5 50	4 45	....	39	....	2 48	....	2 14	30 97	88 05
Apr. 30	**Montclair** south of Kercheval................	171	6-in.	63 76	5 50	5 34	....	91	....	3 80	....	4 59	104 56	188 46
Apr. 26	**Musket** from Artillery west................	271	6-in.	101 71	14 62	11 88	23 17	2 24	20 64	7 02	....	6 83	92 04	280 15
Apr. 19	**Maxwell** from Sylvester south..............	308	6-in.	114 61	8 93	10 68	12 93	1 44	20 48	5 01	....	7 86	144 68	326 62
Mar. 13	**Mitchell** from Boulevard to Milwaukee, also **Milwaukee** from Mitchell to McDougall..........................	625	8-in.	328 51	13 87	28 93	39 50	4 05	41 88	14 21	....	22 24	418 74	911 93

Pipe Laid Inside the City From July 1st, 1908, to July 1st, 1909—continued.

Date	LOCATION	Feet	Size	COST OF CONSTRUCTION										
				Pipe	Specials	Lead	Gates	Misc.	Wells	Cartage	Outside Bills	Sup. & Eng.	Labor	Total
Mar. 31	**Marrentette** from Twelfth to Vermont..........	390	8-in.	204 72	14 82	17 80	19 75	3 58	20 47	12 25	D.P.W. 7 33	16 19	354 50	671 41
Dec. 30	**M. C. R. R.** from Dix north.....	2,545	12-in.	2,616 22	147 75	240 10	224 97	21 96	308 60	76 19	......	127 80	1,476 31	5,239 90
Dec. 11	**Medbury** west of Rivard................	65	6-in.	24 87	85	2 67	....	28	....	2 11	....	1 58	32 25	64 61
Dec. 18	**McDougall** from Harper north	110	6-in.	42 71	3 37	4 05	10 24	47	....	1 61	....	2 66	43 77	108 88
Nov. 12	**Monterey** from Woodward to Hamilton (Highland Park)............. ...	2,626	6-in.	1,127 66	54 72	93 92	127 98	5 36	42 70	40 76	....	63 25	1,027 35	2,583 71†
Nov. 19	**Marquette** from Twelfth to Vermont, also **Vermont** from Marquette north...	356 449	8 in. 6-in.	363 48	10 72	35 07	19 95	3 42	20 17	9 00	....	19 59	307 69	789 09
Nov. 6	**McDougall** from Cleveland to Preston, also **Berlin** from McDougall west.......	163 1,938	6-in. 8-in.	1,115 09	34 01	74 21	112 68	10 98	124 08	6 99	D.P.W. 16 80	71 86	1,397 04	2,963 74
Nov. 3	**Martin** south of Horatio....................	93	10-in.	67 30	....	5 66	....	50	....	1 41	....	3 46	63 77	142 10
Nov. 2	**Martin** from Clayton south.........	999	10-in.	744 82	12 97	49 78	10 24	4 16	....	21 98	....	29 11	320 48	1,193 54
Oct. 12	**Montclair** north of Jefferson	280	6-in.	108 50	9 05	8 35	....	1 45	....	7 80	....	7 41	149 34	291 90
Sept. 29	**Maxwell** from Durand north, also **Durand** crossing Maxwell	227	6-in.	87 35	12 99	8 37	12 93	1 68	20 28	3 79	....	5 34	66 28	219 01

Sept. 19	**Monroe** alley south of, from Farmer west, also **Cadillac Square**, alley north of from Bates west	535	8-in.	281 75	53 96	50 08	46 78 S.S.&V. 89 00	53 68	51 76 Repairs 25 39	28 05	D.P W. 171 19	43 60	907 62	1,802 81
Oct, 7	**Medbury** from Rivard west	121	6-in.	46 24	6 79	7 42	23 03	8 16	20 17	3 41	....	5 32	97 38	217 92
Sept. 10	**Montclair** north of Jefferson	558	6-in.	217 41	2 21	18 55	10 10	6 30	....	13 65	....	14 18	298 89	581 29
Sept. 3	**Marantette** from Vermont to Fourteenth	740	12-in.	695 11	48 81	53 80	72 20	20 07	40 97	16 14	D.P.W. 28 83	37 42	622 21	1,635 56
Aug. 14	**McGraw** from Scotten west	280	6-in.	108 90	3 36	10 18	23 03	6 53	20 80	8 43	....	7 12	102 00	290 35
July 15	**Medbury** alley south of, from St. Antoine west	177	6-in.	68 55	4 66	5 06	23 03	4 83	20 17	2 32	....	4 75	61 55	194 92
Aug. 1	**Mullet** from Chene to Jos. Campau	744	8-in.	398 59	43 26	40 48	19 95	30 09	20 60	28 66	....	32 52	719 21	1,333 36
July 13	**McDougall** from Milwaukee north	100	6-in.	39 17	....	5 06	....	18	....	3 35	....	2 42	48 95	99 13
Apr. 21	**Norton** from Junction west	269	6-in.	100 95	7 15	9 79	23 17	2 43	21 39	8 66	D.P.W. 15 30	7 81	138 86	335 51
Dec. 11	**Nieman** from Haltner to Summit, also **Fairmont** from Nieman west (River Rouge)	1,385	6-in.	503 66	17 57	44 59	25 48	12 76	43 11	23 25	....	26 66	806 21	1,098 20*
Oct. 13	**Navarre** east of McClellan	35	6-in.	13 71	....	1 36	....	26	....	1 72	....	88	18 03	35 96
Aug. 4	**Navarre** east of McClellan	45	6-in.	17 63	....	1 86	....	27	....	1 72	....	1 77	49 45	72 70
May 24	**Oneida** from Kercheval south	1637	6-in.	618 96	23 45	51 18	12 93	5 24	20 04	30 47	....	38 88	792 95	1,594 10*

Pipe laid from July 1st, 1908, to July 1st, 1909—continued.

Date	LOCATION	Feet	Size	COST OF COSNTRUCTION										
				Pipe	Spec-ials	Lead	Gates	Misc.	Wells	Cart-age	Out-side Bills	Supt. & Eng.	Labor	Total Cost
Dec. 1	**Orchard** from Jefferson south (River Rouge)	608	6-in.	260 21	8 95	24 55	25 48	6 25	28 16	21 42	....	12 45	128 13	510 60*
Dec. 15	**Oneida** north of Jefferson................	414	6-in.	161 98	5 50	12 15	....	1 33	....	10 83	....	8 91	164 61	365 31
June 22	**Palmer** west of Collins............	93	6-in.	34 73	84	2 45	....	27	....	1 90	....	1 94	37 46	79 59
Apr. 23	**Post** south of Fort......................	92	6 in.	34 91	....	3 12	....	16	....	3 73	....	1 49	17 41	60 82
Jan. 6	**Pasadena** from Third to Hamilton (H. P.)...	812	6-in.	348 53	16 43	33 08	14 22	4 12	....	18 64	....	17 25	257 25	709 52†
Oct. 22	**Pasadena** from Second west (H. Park)..	813	6-in.	348 75	4 84	28 59	14 22	2 22	21 52	13 71	...	17 20	254 29	705 34†
Nov. 24	**Parker** north of Waterloo................	193	6-in.	75 21	5 50	6 79	....	61	....	1 75	...	3 46	48 44	141 76
Aug. 11	**Putnam** from Fourth to alley west of Second............................	727	8-in.	392 04	33 30	35 07	39 90	26 93	40 98	31 00	D.P.W. 274 79	28 75	551 52	1,454 28
July 10	**Pennsylvania** south of Barker..................	92	6-in.	36 04	....	5 06	....	06	....	5 69	....	1 88	26 30	74 98
Apr. 1	**Rathbone** west of Lawndale..............	140	6-in.	51 61	....	4 67	....	25	....	6 30	....	2 49	37 76	108 08
Nov. 5	**Richton** from Second west (H. Park)	981	6-in.	420 70	8 73	32 67	14 22	2 22	21 18	12 50	....	19 83	280 91	812 96†
Oct. 29	**Rademacher** from Fort to Lafayette, also **Lafayette** from Rademacher to Waterman	1,240	8-in.	670 51	27 81	48 24	59 85	6 26	60 51	22 08	......	29 09	262 44	1,186 79

Oct.	14	**Riopelle** and Byron (River Rouge).....	10	6-in.	86	12 06	2 99	....	20	....	1 75	....	63	7 73	26 22*
Oct.	4	**Riopelle** and Division (River Rouge) . .	8	4-in.	64	7 92	3 98	....	40	....	3 55	....	60	7 50	24 50*
Oct.	4	**Riopelle** and Burke (River Rouge)..........	8	6-in.	2 15	10 86	2 99	....	20	....	3 55	....	69	8 07	28 51*
Sept.	3	**Regular** from Military west.......	353	8-in.	192 20	5 02	17 65	19 95	5 13	44 70	3 87	....	10 18	117 85	416 55
Aug.	18	**Rivard** north of Caniff......................	43	6-in.	15 67	3 30	2 26	....	09	....	1 38	....	92	14 26	37 88
June	4	**Southern** from Livernois east................	210	8-in.	110 03	....	8 90	19 75	....	....	4 00	....	3 56	....	146 24
May	28	**Seyburn** from Sylvester north.........	190	6-in.	70 97	6 34	6 45	....	70	....	5 16	....	4 25	80-60	174 47
May	13	**Superior** from Beaubien west and crossing Brush	223 27	8-in. 6-in.	126 78	19 81	16 02	32 68	7 24	40 70	12 77	D.P.W. 4 31	11 82	221 62	493 75
May	29	**Seneca** north of Gratiot.....................	90	6-in	33 40	....	2 89	....	31	....	2 23	....	1 98	40 16	80 97
May	14	**Stanton** north of McGraw..................	170	6-in.	64 52	....	5 56	....	65	....	5 84	....	3 08	45 98	125 63
Apr.	26	**Seneca** north of Gratiot................. .	171	6-in.	63 76	5 50	5 34	....	2 09	....	2 45	....	3 80	73 16	156 10
Mar.	31	**Stone** from Woodmere east..............	328	6-in.	123 34	8 61	12 77	10 24	1 61	....	9 47	....	7 27	114 30	287 61
Jan.	23	**Seminole** north of Kercheval..........	110	6-in.	42 51	1 36	4 45	....	77	....	2 75	....	2 81	60 59	115.24
Dec.	7	**Stoner** from Jefferson south (R. Rouge)..	900	6-in.	386 01	7 16	35 67	25 48	8 68	22 00	31 64	....	18 98	242 58	778 20*
Nov.	21	**St. Clair** south of Mack......................	400	6 in.	155 90	5 50	11 13	....	1 01	....	6 45	....	7 28	111 03	298 30

Pipe Laid from July 1st, 1908, to July 1st, 1909—continued.

Date	LOCATION	Feet	Size	COST OF CONSTRUCTION										
				Pipe	Specials	Lead	Gates	Misc.	Wells	Cartage	Outside Bills	Sup. & Eng.	Labor	Total Cost
Nov. 14	**Scotten** from Tireman south	904	6-in.	351 36	13 55	25 97	23 17	1 99	20 17	10 61	....	19 33	325 80	791 95
Oct. 23	**Stone** from Woodmere west, also **Woodmere** crossing Stone	355 18	6-in. 8-in.	116 77	13 20	11 13	12 93	84	20 17	6 51	....	7 48	89 34	308 37
Oct. 29	**Solvay** from South north	960	12-in.	902 12	45 42	67 88	41 80	5 08	23 49	25 50	....	36 88	385 57	1 533 74
Oct. 21	**Summit** from Jefferson north	1,073	12-in.	1,010 37	29 22	72 40	36 10	26 64	25 03	32 86	D.P.W. 6 28	51 25	817 19	2,107 32
Oct. 17	**St. Jean** north of Khrchcval	123	8-in.	67 16	....	3 70	....	37	...	7 55	......	3 56	63 81	146 15
Sept. 30	**Second** from Fort to alley north of Howard	909	8-in.	487 60	56 65	61 22	72 78	43.06	81 14 Repairs 1 86	73 32	D.P.W. 322 73	50 94	1,162 11	2,413 41
Sept. 30	**Stanton** north of McGraw	26	6-in.	9 40	....	1 22	....	02	....	69	....	48	8 04	19 85
Sept. 29	**Scotten** south of Moore Place	209	6-in.	80 69	7 77	7 42	...	3 70	....	5 68	....	4 54	76 42	186 22
Sept. 21	**Seneca** from Gratiot north	201	6-in.	79 99	2 21	7 42	23 03	5 99	19 15	6 06	....	5 85	89 95	239 65
Sept. 9	**Springwells** from Chamberlain south	610	12-in.	569 76	36 42	40 72	36 10	4 24	28 83	19 97	....	23 60	212 92	967 56
July 25	**Scotten** from Porter to Dix	1,484	12-in.	1,400 84	72 36	116 38	141 18	13 11	110 57	104 89	D.P.W. 9 97	78 82	1,183 68	3,231 80
July 27	**Spruce** from Brooklyn to alley east	623	8-in.	336 89	35 59	25 30	50 00	10 00	62 23	17 52	......	24 74	452 09	1,014 36

June	16	**Thirty-second** south of Devereaux	64	6-in.	23 92	84	2 67	......	13	....	88	....	1 26	21 28	50 96
June	7	**Thompson Court** from Forest north	160	6-in.	59 96	10 38	8 01	12 93	2 98	19 72	7 27	...	5 84	112 41	239 58
May	22	**Thompson Court** from Hancock south	163	6-in.	61 10	9 98	7 83	12 93	78	19 72	5 28	....	5 62	106 59	229 83
May	14	**Twenty-eighth** north of McGraw	170	6-in.	63 95	84	5 56	....	43	....	5 02	....	3 18	51 31	130 29
Jan.	9	**Tyler** from Lincoln east (H. Park)	510	6-in.	218 42	22 14	24 50	39 70	3 61	23 15	24 51	....	13 03	165 35	534 41†
Nov.	7	**Trumbull** from Michigan to Myrtle and cross connections	4,053 205 38	12-in. 8 in. 6-in.	3,937 60	212 52	316 53	479 66	71 41	411 95	461 75	D.P.W. 19 58	253 68	4,252 29	10,416 97
Nov.	17	**Twenty-fifth** from Baker to Porter, also **Shady Lane** from Twenty-fifth to Boulevard	1,061 319	8-in. 6-in.	701 32	33 97	69 01	83 02	75 65	111 15	28 56	D.P.W. 15 17	45 22	706 48	1,869 55
Sept.	19	**Twenty-first** from Howard to Bristol	1,027	12-in.	971 32	70 54	75 79	114 00	37 75	62 96	61 50	....	52 95	724 32	2,171 13
Sept.	3	**Third** from Fort to Abbott	1,079	8-in.	578 28	105 99	63 08	128 90	41 47	66 92	56 24	D.P.W. 29 71	55 17	1,168 59	2,294 35
Aug.	19	**Thirtieth** from Horatio north and south	512	6-in.	199 77	7 08	16 97	12 93	2 07	21 40	10 66	....	9 90	125 16	405 94
Aug.	16	**Thirty-second** north of Herbert	120	6-in.	47 01	....	4 07	....	67	....	1 97	....	2 49	45 94	102 15
July	3	**Twenty-eighth** north of McGraw	123	6-in.	47 79	5 50	4 53	....	84	......	2 43	......	2 83	51 97	115 89
July	22	**Tireman** from Boulevard west	738	16-in.	1,109 33	14 51	86 02	208 03	24 75	102 19	34 99	....	52 80	545 41	2,178 03
May	26	**Vincennes** east of McClellan	184	6-in.	68 31	8 57	5 56	10 24	97	....	6 04	....	4 29	72 27	176 25

Pipe Laid from July 1st, 1908, to July 1st, 1909—continued.

Date	LOCATION	Feet	Size	COST OF CONSTRUCTION										
				Pipe	Spec-ials	Lead	Gates	Misc.	Wells	Capt-age	Out-side Bills	Sup. & Eng.	Labor	Total Cost
Dec. 22	**Vernor** from Livernois west	461	6-in.	179 01	9 73	18 20	23 17	2 38	21 00	11 73	....	11 85	208 64	485 71
Sept. 17	**Vermont** from Myrtle to Magnolia	532	8-in.	283 38	47 48	31 54	39 90	6 34	60 51	17 07	D.P.W. 6 43	22 60	417 83	933 08
July 6	**Waterloo** west of Concord, and **Waterloo** from Concord west	358 523	48 in. 8-in.	3,555 23	406 25	213 73	52 43	39 28 Lumb'r 61 89	62 15 Piers 42 26	Mat'ri'l 143 48 Dirt 86 50	D.P.W. 31 90	182 23	2,625 92	7,503 25
June 23	**Waterloo** from Mt. Elliott east, also **Mt. Elliott** from Waterloo north, also **Cleveland** from Mt. Elliott to McDougall; also **McDougall** from Cleveland to Jay, also **Jay** from McDougall to Jos. Campau	4,759 2,186	48-in. 8-in.	46,511 80	2,272 82	2,254 37	2,426 80	307 55 Lumb'r 583 54	C'ncr'te and Repairs 443 88 Wells 1,160 94 Piers 3,768 52	Mat'ri'l 1,247 37 Dirt 2,446 50	D.P.W. 158 31 M.CRR 139 58 Amb'ce 2 00 Gas Co. 59 17	2,134 60	23374 87	89,295 71
June 14	**West End** from Mackie north	1,029	8-in.	540 64	36 18	52 95	39 50	2 81	41 12	27 48	....	27 19	347 01	1,114 88
Apr. 17	**Williams** from Warren south	298	6-in.	113 09	....	8 90	....	1 05	....	6 55	....	6 49	129 93	206 01
Mar. 26	**Winder** from Hastings to Antoine	645	8-in.	338 56	30 52	38 49	56 23	23 27	59 79	33 84	D.P.W. 13 66	33 14	744 95	1 372 45
Nov. 30	**Warren** from Bellevue to Beaufait	417	10-in.	209 87	35 64	32 40	26 65	4 67	21 11	11 55	....	17 31	260 68	709 88
Nov. 23	**Warren** from Mt. Elliott west, also alley west of **Mt. Elliott** from Warren to Hancock, also **Hancock** east of Heck Place	604	6-in.	232 00	13 20	16 20	12 93	1 84	20 17	4 46	....	12 85	192 58	506 83

Oct. 20	**Waverly** west of Second (H. Park)...... ...	303	6-in.	129 47	6 05	12 25	....	36	....	4 00	....	6 23	99 40	257 76†
Oct. 19	**Windemere** east of John R. (H. Park)........ .	406	6-in.	172 98	9 95	16 33	......	74	....	4 75	....	8 07	117 90	330 72
Nov. 13	**Warren** west of Lovett.....................	60	6-in.	23 50	85	2 17	....	04	....	1 32	....	1 15	18 08	47 11
Sept. 21	**Warren** west of Lovett	76	6-in.	28 20	3 55	3 71	....	17	....	5 34	....	2 20	36 86	80 03
Sept. 25	**Warren** west of Thirty-first	219	10-in.	161 53	2 23	11 13	....	60	......	7 71	....	8 01	126 94	318 15
Aug. 1	**Woodward** crossing Jefferson (Ecorse)...........	53	6-in.	23 30	5 69	6 13	14 22	3 06	23 00	6 97	....	3 12	42 29	127 78§
Aug. 21	**Water Works Grounds** (Pumping Station).....	8	4-in.	2 30	3 78	1 81	...	23	....	....	....	1 97	70 58	80 67

Recapitulation of Construction.

Total Pipe Laid, Gates Set, and Wells Built.

	Feet.		Cost.	Total.
Detroit	131,680		$593,029.71	
Village of River Rouge.	6,439		6,023.85	
Village of Hamtramck..	1,277		1,310.90	
Village of Grosse Pointe Park	795		1,090.56	
Village of Ecorse	104		256.19	
Village of Highland Park	13,744		12,704.51	
	154,039	— $29\frac{919}{5280}$ Miles		614,415.72
Gate wells built over old lines			$ 327.12	
Drinking fountains set			2,121.63	
Gates set on old lines			385.90	
Air chambers put on			126.67	
Blow-offs connected to sewer			71.21	
				3,032.54
Grand total				$617,448.26

Attached find a summary of statistics in the form recommended by the New England Water Works Association. This summary has been compiled jointly by the Secretary and Civil Engineer from information obtained from all departments.

Respectfully submitted,

GEORGE H. FENKELL,

Civil Engineer.

SUMMARY OF STATISTICS

For the Year ending June 30th, 1909

In form recommended by the New England Water Works Association.

The Board of Water Commissioners of the City of Detroit, Wayne County, Michigan.

Population by census of 1900, 285,704.

Date of construction 1827, to date.

By whom owned, The Board of Water Commissioners of the City of Detroit.

Source of supply, Detroit River.

Mode of supply (whether gravity of pumping), pumping.

PUMPING STATISTICS.

1. Builders of Pumping Machinery.

One Compound Beam, Det. Loco. Wks., Detroit, Mich.

Two Compound Beam, Riverside Engine Wks., Detroit, Mich.

Three Triple Expansion { 2 Aillis Chalmers, Milwaukee, Wis.
1 E. P. Allis & Co., Milwaukee, Wis.

2. Description of fuel used.
a. Kind, bituminous, run of mine.
b. Brand of coal, Meadowbrook.
c. Average price of coal per GROSS ton, delivered f. o. b. boat, Water Wks. dock, $2.55

d. Percentage of ash, 6.7

e. Wood, price per cord, none.

3. Coal consumed for the year, 36,066,844 lbs.

4. [Pounds of wood consumed] ÷ 3 = equivalent amount of coal, no record.

4a. Amount of other fuel used, none.

5. Total equivalent coal consumed for the year = (3) + (4), same as No. 3.

6. Total pumpage for the year, 27,816,750,890 gallons.

Allowance for slip 1% for three compound and one triple expansion.

Allowance for slip none for two triple expansion.

7. Average static head against which pumps work, direct pressure, no reservoir.
8. Average dynamic head against which pumps work.
   High system, 67.08 lbs., 155 ft.
   Low system, 55.06 lbs., 127 ft.
   Whole system, 57.36 lbs., 132.5 ft.
9. Number of gallons pumped per pound of equivalent coal (5), 771.
   gallons pumped (6) × 8.34 (lbs.) × 100 × dynamic head (8)
10. Duty = total fuel consumed (5).....................87,945,076

Total Fuel Consumed.

Total cost of pumping per million gallons, figured on pumping station's expenses, $3..33.

11. Cost of fuel per million gallons pumped, $1.67.
12. Total cost per million gallons raised one foot (dynamic), $.0124.

Financial Statistics.

Receipts.

Balance brought forward	$ 72,879.98
(a) From ordinary (maintenance) receipts	807,001.63
(b) From extraordinary receipts (bonds, etc.)	300,000.00
Total	$1,179,881.61

From Water Rates—

A. Fixture rates	$ 398,220.75
B. Meter rates	229,956.90
C. Total from consumers	628,177.65
D. For hydrants	
E. For fountains	
F. For street watering	
G. For public buildings	
H. For miscellaneous uses	
I. For general appropriations	
J. Total from municipal departments	
K. From tax levy	75,000.00

L.	From bond issue and loan	300,000.00
M.	From other sources	103,823.98
	Balance forward	72,879.98
N.	Total	$1,179,881.61

Expenditures.

Water Works Maintenance—			
AA.	Operation (management and repairs)		
BB.	Special:		
CC.	Total maintenance		$ 182,163.74
DD.	Interest on bonds		37,273.50
	(CC + DD)		$ 219,437.24
EE.	Payment of bonds		10,000.00
	Bonds purchased by Sinking Fund		75,000.00
FF.	Sinking Fund		
Water Works Construction—			
GG.	Extension of mains	$764,971.99	
HH.	Extension of services		
II.	Extension of meters	14,653.03	
JJ.	Special:		
	Pumping Works	41.777.68	
KK.	Total construction		821,402.70
LL.	Unclassified expenses: Real estate		24,001.06
	Miscellaneous: Hurlbut Fund		4,688.77
MM.	Balance:		
	(aa) Ordinary	$	
	(bb) Extraordinary		
	Total balance		25,351.84
N.	Total		$1,179,881.61

Disposition of balance:

O.	Net cost of works to date	$9,645,904.60
P.	Bonded debt at date	1,180,000.00
Q.	Value of Sinking Fund at date, including bonds, etc.	97,910.85
R.	Average rate of interest, 3½%+	

Statistics of Consumption of Water.

1.	Estimated total population at date, City of Detroit	440,618
2.	Estimated population on lines of pipe	458,175
3.	Estimated population supplied	455,029
4.	Total consumption for the year	27,816,750,890 gallons
5.	Passed through meters	8,768,974,646 gallons
6.	Percentage of consumption metered	31.5+
7.	Average daily consumption	76,210,276 gallons
8.	Gallons per day to each consumer	168.4
9.	Gallons per day to each inhabitant, City of Detroit	167.3
10.	Gallons per day to each tap	876
11.	Cost of supplying water, per million gallons, figured on total maintenance (item C. C.)	$6.54
12.	Cost of supplying water, per million gallons, figured on total maintenance + interest on bonds (item C. C.)	$7.89

Statistics Relating to Distribution System.

Mains.

1. Kind of pipe, cast iron.
2. Sizes, from 2 inch to 48 inch.
3. Extended, 154,039 feet during year.
4. Discontinued, 25,665 feet.
5. Total now in use, 752.09 miles.
6. Cost of repairs per mile, $2.54.
7. Number of leaks per mile, 0.128.
8. Length of pipe less than 4 inches in diameter, 10.35 miles.
9. Number of hydrants added during year (public) 396.
10. Number of hydrants (public)now in use, 5,243: cisterns, 551.
11. Number of stop gates added during year, 352.
12. Number of stop gates now in use, 7,954.
13. Number of blow-offs, 961.
14. Number of stop gates smaller than 4-inch, 21.
15. Range of pressure on mains, 8 lbs. to 62 lbs. (Extremes from hourly readings at pressure gauges.)

Services.

16. Kind of pipe, mostly lead and cast iron, some galvanized iron.
17. Sizes, ⅝" to 10".
21. Number of service taps added during the year. 3,683.
22. Number now in use, 86.649.

25. Number of meters added, 509.
26. Number now in use, 7,956.
27. Percentage of services metered, 9%.
28. Percentage of receipts from metered water (B+C). =
29. Number of motors and elevators added, none.
30. Number now in use, 36.

REPORT OF SUPERINTENDENT OF METERS AND INSPECTION.

DETROIT, JULY 1, 1909.

To the Board of Water Commissioners:

GENTLEMEN:—In compliance with the rules and regulations of your honorable body, I herewith report the work done in the Meter, Inspection and Service Cocks Departments from July 1, 1908, to July 1, 1909:

Number of Meters placed from July 1, 1908, to July 1, 1909.

	SIZES								
	⅝ in.	¾ in	1 in.	1½ in	2 in.	3 in.	4 in	6 in	Total
In service July 1, 1908........	8,783	1,435	1,191	415	356	147	96	2	7895
Placed during the year ending June 30, 1909	375	114	73	20	28	7	2	5	634
	4,158	1,549	1,264	445	384	154	98	29	8081
Removed during the year ending June 30, 1909..............	70	11	26	7	9	2			125
Total number in service July 1st. 1909....................	4,088	1,538	1,238	438	375	152	98	29	7.956

In Service July 1, 1909.

KIND.	SIZES								
	⅝ in.	¾ in.	1 in.	1½ in.	2 in.	3 in.	4 in.	6 in.	Total
Thomson	4,083	1,532	1,214	434	369	148	86	29	7.895
Crown...........................	2	5	8	2	1	1	2	......	21
Hersey..........................	2	......	14	2	2	1	6	.....	27
Worthington.....................	......	1	2	......	3	2	2	......	10
Union Rotary....................	1	......	...	......	......	......	1	......	2
Keystone........................	......	......	......	......	......	......	1	......	1
Total	4,088	1,538	1,238	438	375	152	98	29	7.956

Indicators attached to hydraulic elevator..36

Meters in Stock, July 1st, 1909.

KIND	SIZES							
	⅝-in.	¾-in.	1-in.	1½-in.	2-in.	3-in.	4-in.	Total
Thomson	31	3	6	11	2	1	2	56
Crown	....	....	....	2	1	....	....	3
Hersey	....	....	6	....	....	....	....	6
Aggregate	31	3	12	13	3	1	2	65

Valuation of meters, material, tools, fixtures, etc., in stock July 1st, 1909		$ 2,994.39

Valuation of meters in service July 1st, 1908		$123,611.79
Deduct for meters sold	$ 860.70	
Deduct 2 per cent for depreciation in value	2,472.23	3,332.93
		$120,278.86
Add amount omitted in 1908 report	$1,000.00	
Add amount expended for meters placed from July 1, 1908	8,841.38	9,841.38
Total valuation of meters in service July 1, 1909		$130,120.24

Total expended for meters, labor, material, tools, etc., for the year ending June 30, 1909	$14,653.03

Inspection.

The greater portion of the work done by the inspectors of the different wards during the past year is shown below:

New connections examined—city	3,405
New connections examined—Hamtramck Village	287
New connections examined—Highland Park	52
Extensions examined	1,733
Buildings examined	8,320
Fixtures inspected	7,774
Let on new connections	3,113
Let on for building purposes	947
Let on vacancies reoccupied	878
Let on non-payment	694
Building tax notices	3,844
Delinquents notified	29,430
Shut off for non-payment	887
Shut off for vacancy	1,104
Shut off for leak	218
Inquiries for assessors	7,944
Meters read	45,250
Meter bills delivered	29,374
Examinations for leaks	14,124
Leaks reported	1,180
Total	160,558

Service Cocks.

Three thousand four hundred and five (3,405) taps were made during the past year, being 540 less than the year previous. One hundred and nineteen (119) were abandoned, making a net gain of three thousand two hundred and eighty-six (3,286) and a total of 83,992. in the city.

Three hundred and ninety-seven (397) taps were also made in the adjoining villages, as follows: Highland Park, two hundred and eighty-seven (287); Hamtramck, fifty-two

(52); River Rouge, forty (40), and Ecorse, eighteen (18), a total of twenty six hundred and fifty-seven (2,657) in the villages, and a total of eighty-six thousand six hundred and forty-nine (86,649) in the city and villages.

See the following tables for details:

Number and Size of Taps and those Disconnected in each Ward During the Year Ending June 30th, 1909.

	WARDS																		
Sizes	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Total
Inserted	229	126	158	248	116	51	22	122	53	136	66	202	154	182	225	190	835	290	3,405
Discont'd	14	8	15	10	15	16	4	9	2	7	......	2	2	......	5	1	6	3	119
Net total	215	118	143	238	101	35	18	113	51	129	66	200	152	182	220	189	829	287	3,286

Total service connections in the Villages of Highland Park, River Rouge, Ecorse and Hamtramck.

	In Service July 1, 1908	Inserted 1908-9	Total July 1, 1909
Highland Park	562	287	849
River Rouge	783	40	82
Ecorse	275	18	293
Hamtramck	640	52	692
Aggregate	2,260	397	2,657

Total number of service connections in the city and adjoining villages, July 1st, 1909.

Total city	83,992
Total villages	2,657
Aggregate	86,649

Attached herewith is a complete list of tools on hand and an itemized account of material in stock in the meter and inspection departments, and also the number and sizes of sleeves and valves on hand in the service cocks department on the first day of July, 1909.

All of which is respectfully submitted.

T. R. PUTNAM,
Supt. Meters and Inspection.

REPORT OF CHIEF ENGINEER AT PUMPING WORKS.

Detroit, July 1, 1909.

To the Board of Water Commissioners:

Gentlemen—I have the honor to submit the Engineer's rereport for the year ending June 30, 1909.

The following table shows the number of gallons of water pumped, and cost of fuel for the years named:

YEAR	Gallons of Water Pumped.	Cost of Fuel Consumed	Average Daily Delivered.
1852	235,840,271	....	646,411
1853	303,531,743	$ 2.129 37	931.594
1854	376,265,126	2,271 34	1,030,866
1855	542,807,364	3,325 81	1,487,143
1856	692,124,305	4,017 44	1,896,231
1857	697,190,523	3,993 20	1,909,837
1858	718,091,207	3,655 20	1,967,373
1859	782,112,587	3,194 15	2,142,774
1860	870,036,451	4,196 21	2,383,580
1861	895,129,423	4,414 07	2,452,409
1862	994,945,329	3,150 95	2,725,878
1863	1,035,798,043	4,670 86	2,837,803
1864	1,018,390,256	7,647 62	2,839,078
1865	1,049,514,887	7,372 89	2,875,383
1866	1,196,317,922	9,349 16	3,277,583
1867	1,425,535,230	10,121 82	3,905,576
1868	1,666,545,125	11,379 23	4,507,248
1869	1,946,810,325	11,247 92	4,511,809
1870	1,866,060,068	12,713 78	5,112,493
1871	2,300,150,605	14,681 05	6,301,782
1872	2,782,292,578	17,736 86	7,601,892
1873	3,198,393,948	20,233 30	8,762,723
1874	3,289,872,635	20,481 71	9,013,350
1875	4,207,454,260	21,393 98	11,527,272
1876	4,065,134,470	19,832 89	11,107,499
1877	4,213,239,790	17,433 72	11,543,123
1878	4,345,743,330	10,943 82	11,906,146
1879	5,129,599,110	11,219 51	14,053,696
1880	5,552,965,310	12,276 60	15,172,036
1881	6,543,127,968	16,556 63	17,926,377
1882	6,284,000,742	13,156 16	17,261,440
1883	7,379,327,188	16,495 99	20,217,334
1884	8,510,614,140	19,877 07	23,253,044
1885	9,970,829,580	21,341 48	27,317,341
1886	10,576,571,254	20,387 24	28,976,907
1887	13,168,859,808	35,882 83	36,079,166
1888	14,380,166,670	39,568 66	39,397,716
1889	12,875,834,453	34,413 31	35,274,888
1890	12,120,944,532	31,852 40	33,209,067
1891	12,057,261,236	38,826 86	33,033,592
1892	12,476,612,482	31,034 40	34,182,499
1893	13,877,977,208	27,479 93	38,021,855
1894	13,649,779,605	29,283 47	37,396,656
1895	14,698,451,954	32,095 00	40,269,731
1896	13,254,369,371	31,186 17	36,215,123
1897	12,928,821,326	17,355 58	35,421,428
1898	14,278,682,058	17,880 19	39,092,252
1899	16,348,062,701	19,011 67	44,789,212
1900	17,077,100,477	25,898 50	46,786,576
Jan. 1 to July 1 1901...	8,849,732,755	16,881 31	48,893,551
July 1, 1901 to July 1 1902	18,333,104,706	24,830 79	50,200,204
July 1, 1902 to July 1 1903	18,757,682,360	26,909 99	51,390,911
July 1, 1903 to July 1, 1904	21,734,954,284	38,461 08	59,385,121
July 1, 1904 to July 1, 1905	21,977,576 875	32,079 27	60,212,539
July 1, 1905 to July 1 1906	22,395,312,104	29,394 17	61,357,019
July 1, 1906 to July 1, 1907	25,118,295,041	37,461 48	68,817,247
July 1, 1907 to July 1, 1908	26,857,139,195	43,055 84	73,380,162
July 1, 1908 to July 1, 1909	27,816,750,940	46,547 97	76,210,276

The cost of fuel per million gallons pumped was $1.67 and per million gallons pumped 100 feet high was $1.24. The table shows that the amount of water pumped during the year was 27,816,750,940 gallons, making the daily average 76,210,276, which is an increase of 3.85 per cent compared with the preceding year.

The total expense during the year for pumping water, including maintenance, heating station, library and greenhouse, hoisting coal, etc. was $92,745.94, thus making cost per million pumped $3.33.

The station duty of coal consumed for all purposes for the year was 86,719,362 foot pounds.

Respectfully yours,

URIAH GOULD,

Chief Engineer.

Roll of Commissioners and their Tenure of Office.

James A. Van Dyke	1853	1855	Died.
Edmund A. Brush	1853	1868	Resigned.
Henry Ledyard	1853	1859	Resigned.
Shubuel Conant	1853	1859	May 1st.
William R. Noyes	1853	1865	Resigned.
Alexander D. Frazer	1855	1871	May 1st.
Julius D. Morton	1859	1865	Died.
John V. Ruehle	1859	1861	Resigned.
Chauncy Hurlbut	1861—1863	1868—1885	Died.
Stanley G. Wight	1863	1868	May 1st.
Jacob S. Farrand	1865	1890	May 1st.
John Owen	1865	1879	May 1st.
Caleb Van Husan	1868	1872	May 1st.
Samuel F. Hodge	1871	1879	Resigned.
Elija Smith	1872	1877	May 1st.
Michael Martz	1877	1887	May 1st.
James Beatty	1879	1885	Died.
John Pridgeon	1879—1884	1886—1891	May 1st.
Marshall H. Godfrey	1884	1889	Resigned.
Edwin P. Conely	1885	1886	May 1st.
Samuel G. Caskey	1885	1895	May 1st.
Joseph Nagel	1887	1890	Died.
August Goebel	1889—1894	1897—1898	Resigned.
Henry M. Duffield	1890	1895	May 1st.
Joseph L. Hudson	1890	1894	May 1st.
Frank E. Kirby	1891	1896	May 1st.
Albert L. Stephens	1894	1897	May 1st.
D. W. H. Moreland	1894	1896	Resigned.
Clarence A. Black	1894	1894	Resigned.
Edward W. Pendleton	1894	1909	May 1st.
Darius D. Thorp	1895	1905	May 1st.
John P. Huckestein	1896	1897	Resigned.
John W. McGrath	1896	1901	May 1st.
Joseph J. Noeker	1898	1902	May 1st.
James W. Millen	1897	1898	May 1st.
James Meathe	1898	1899	Died.

Benjamin Guiney	1899	1900	Resigned.
John Zynda	1900	1908	May 1st.
Joseph J. Crowley	1901	1906	May 1st.
John Schroeder	1902	1907	May 1st.
John F. Dodge	1905	....	
Fred J. Clippert	1906	....	
James H. Pound	1907	....	
Basil A. Lemke	1908	....	
James Wilkie	1909	....	

FIFTY-EIGHTH
ANNUAL REPORT
OF THE
BOARD OF WATER COMMISSIONERS

WATER WORKS

TO THE

COMMON COUNCIL OF THE CITY OF DETROIT

FOR YEAR
ENDING JUNE 30TH
1910

President
Dr. Fred. J. Clippert

FIFTY-EIGHTH ANNUAL REPORT

OF THE

Detroit

Board of Water Commissioners

OF THE CITY OF DETROIT

TO THE

Common Council of the City of Detroit

TOGETHER WITH THE

Reports of the Officers of the Board

For Year Ending June 30th, 1910

THOS. SMITH PRESS
DETROIT

CONTENTS.

	Page
Report of the Commissioners	9
Financial Report of the Secretary	23
Report of the General Manager	26
Report of the Civil Engineer	37
Summary of Statistics	49
Report of the Chief Engineer at Pumping Works	52
Roll of Commissioners	53

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BOARD OF WATER COMMISSIONERS
OF THE
CITY OF DETROIT

MEMBERS:

FREDERICK J. CLIPPERT, 1911
BASIL A.LEMKE, 1913
JAMES H. POUND, 1912
JAMES WILKE, 1914
JOHN GILLESPIE, 1915

COMMITTEES:

Ways and Means	Commissioners LEMKE and POUND
Extension and Construction	Commissioners POUND and WILKE
Pumping Station	Commissioners WILKIE and GILLESPIE
Supplies	Commissioners GILLESPIE and LEMKE

The President is ex-officio member of each Committee.

OFFICERS:

President,	FREDERICK J. CLIPPERT
Vice President,	JAMES H. POUND
General Manaer,	H. S. STARKEY
Secretary,	BENJ F. GUINEY
Civil Engineer,	GEORGE H. FENKELL
Supt. of Meters and Inspection,	THOMAS R. PUTNAM
Chief Engineer at Pumping Works,	URIAH A. GOULD
Bookkeeper,	GEORGE BARRIE
Receiving Clerk,	GEORGE E. KUNZE
Cashiers,	D. C. GROBBEL CHARLES W. KEENA
Meter Clerks,	W. W. COONEY CHAS F. GILMER
Permit Clerk,	LOUIS J. MONTGOMERY
Assessors,	FRANK PETZ ALBERT L. STADLER ANTHONY VOGEL OSCAR A. RIOPELLE WM. COSGROVE JOHN W. PALMER M. A. DETTLING THOMAS J. CLANCY JOHN C. BECKER GEO. P. MOOG

THE BOARD OF WATER COMMISSIONERS OF THE CITY OF DETROIT

Rates adopted June 15th, 1909

FROM JULY 1ST, 1909,

Payable Quarterly	Quarterly
First 30,000 gallons	**$1 75**
All in excess of 30,000 gallons	**3 cts. per M.**
Minimum rate	**1 75**

ASSESSMENT RATES

	Per Annum
For Family, household purposes, each family	**$3 20**
Greenhouses—Special rates.	
Private Stable, for each horse	**1 20**
Livery Stable, for each horse	**1 00**
Dray and Team Horses, each	**1 00**
Cows, each	**1 00**
Stores and Offices, from	**$1 00** to **12 00**
Bakeries, average daily use for each bbl. of flour	**2 00**
Groceries and Provision Stores, from	**3 00** to **50 00**
Saloons, from	**6 00** to **50 00**
Bar, with faucet, from	**8 00** to **50 00**
Fish Houses, from	**6 00** to **50 00**
Beer Pump	**2 00**
Barber Shops, each chair	**2 00**
Slaughter-houses—Special rates.	
Hotels and Taverns, in addition to family rate, each room	**60**
Boarding Schools, from	**4 00** to **50 00**
Printing Offices—Special rates.	
Butcher Stalls, each not less than	**3 00**
Work Shops, for 10 persons or under	**3 00**
Work Shops, for each additional 10 persons	**3 00**
Boarding Houses, in addition to family rate, each boarder or roomer	**40**
Estimated quantities of water, each 1,000 gallons	**07**
Building Purposes, each 1 M. brick	**03**
“ “ each 100 yards plastering	**05**
“ “ each perch stone	**01**
“ “ minimum	**50**
Automobiles, each	**1 20**

FIXTURES.

Bath Tub, for families, each	**1 00**
“ public, each tub	**4 00**
Automatic Water Closets, for family, 1st closet	**1 60**
“ “ “ each, additional	**60**
“ “ “ for hotels, stores, factories, etc., for 10 persons	**2 00**
“ “ “ each additional person	**20**
Rod Water Closets, not less than	**6 00**
Urinals, not less than	**2 00**
Wash Hand Basin, for family, each	**48**
“ “ “ for other purposes, each person	**15**
Hose Bibb or connection, Premises 30 feet front or less	**1 00**
“ “ “ “ 30 feet to 60 feet	**1 40**
“ “ “ “ 60 feet to 100 feet	**2 00**
Special rates for larger grounds.	
Fountains	**$10 00** to **20 00**
Street Sprinklers, each wagon	**50 00**

Where there is a waste of water an increase of rates will be made.

ANNUAL REPORT
OF THE
BOARD OF WATER COMMISSIONERS
OF THE
CITY OF DETROIT
JULY 1, 1909 TO JUNE 30, 1910.

TO THE HONORABLE

The Common Council of the City of Detroit.

GENTLEMEN:—The undersigned, the Board of Water Commissioners of the City of Detroit, herewith present to you their report, conformable to law, of their doings during the fiscal year ending June 30, 1910.

It has been a year of abundant work and progress in the construction and laying of new water mains throughout the city where the needs of business or the wants of the home-builder demanded. The calls for the laying of new pipe and the replacing of insufficient ones, in business sections, have been very numerous, as this report will demonstrate.

And first, it is well to be 'borne in mind that while the territorial limits of Detroit has not been extended, or in any-wise enlarged during the last year, the population has increased over twenty-five thousand souls, as estimated by the rules governing this department for many years, and found by experience to be approximately correct.

The increase of manufactories in the city of Detroit and the territory contiguous thereto has been very satisfying, furnishing as it does ample labor for the occupants of the dwelling houses, which were also being constantly in the process of construction throughout the year last gone past. All of which while gratifying has required much work to keep up with the requirements of these interests in the way of water supply upon the part of this department.

The construction work in general, necessary to this department to enlarge the facilities and improve the apparatus for pumping water all in actual operation, has been carried on as rapidly as possible. And we report to your honorable body the fact that of the mains four feet and forty-two inches in diameter, this Board has caused to be laid upon Jay and High streets; also upon Palmer and Sheridan avenues, and at the crossing of the Michigan Central Railway, at Fifteenth and Sixteenth streets, nearly two and one-quarter miles this year, at an expenditure of approximately for piping, and cost of laying of the same, alone, of the sum of seventeen dollars per foot. This immense outlay is in the judgment of this Board absolutely necessary, as trunk supply mains, to distribute water, in the center lower half of the low pressure system of this city.

That upon Kercheval avenue, and east of Bewick, we have laid nearly one-half mile of sixteen inch pipe, and that in the near future we will have to plant equally as large, or perhaps a larger main in Waterloo street, as soon as the same is fully opened to the Alter Road, as it is now being done through the Recorder's Court. That the phenomenal building of factories and houses in this territory imperatively demand that this action be taken by this Board, in the near future, and that the same must be completed upon both these streets, Kercheval and Waterloo, within the next five years if our present ratio of increase in population continue.

This Board reports the laying of three miles of twelve inch pipe; seven miles of eight inch pipe; and fifteen miles of six inch pipe, the last year, upon one hundred and seventy-two streets and avenues, including the following lines, each of which was over one-third mile in length.

In Boston Boulevard, 5,340 feet of 6-inch, 232 feet of 8-inch, and 100 feet of 12-inch; Gladwin Park to Belle Isle, one mile of 12-inch; Chicago Boulevard, 7,877 feet of 6-inch, and 122 feet of 8-inch; Dix avenue, 3,635 feet of 12-inch, 150 feet of 6-inch, 138 feet of 16-inch, and 88 feet of 10-inch; Edison avenue, 1,937 feet of 8-inch; Fort street West, 2,700 feet of 12-inch and 25 feet of 6-inch; Glynn Court, 2,397 feet of 8-inch and 97 feet of 12-inch; Massachusetts avenue, 2,658 feet of 8-inch; Palmer avenue East, 2,426 feet of 6-inch and 836 feet of 8-inch; or, in round numbers, nearly twenty-eight miles of new large distributing pipe, costing the large sum of $600,020 approximately, including the removal of small pipe, long ago outgrown in the business districts, such as four inch pipe on Fort street east of Randolph and west of Orleans; also upon Monroe and Champlain of a similar character, replaced by larger and more efficient sizes, more up to date, and amply able to supply water in sufficient quantities to overcome any conflagration reasonably liable to arise under a liberal construction of the doctrine of chances, solving all questions of doubt in favor of the citizen.

Work on the new pumping station, such as we have already advised your honorable body of, with an ultimate additional capacity of one hundred and eighty million gallons per day, has not only been begun, but is well under way and constructed directly by this Board, and under the supervision of its own employees. At least, so far as the planting of the basement is concerned, and we can report that this is now well nigh done.

This Board has also contracted for the construction of three high duty pumping engines, with a direct capacity of thirty million gallons each, which are now in the course of construction at the contractor's shop, in South Bethlehem, Pennsylvania.

The four feet and forty-two inch force mains already reported to your honorable body as within our plans and contemplation, and as being at our last report in course of construction, one being for the purpose of reinforcing the water supply for the low service district, including the eastern and western portion of the city of Detroit, has been continued from where it was completed in Kercheval and other streets, as shown by our last report, along Jay and High streets, the same being now in service from Gladwin Park and the pumping station to St. Antoine street, nearly halfway of the proposed route. It has been found upon putting this pipe into commission to operate very beneficially in pressure reduction and reduced strain upon the pipes in the vicinity of this improvement, and generally in the territory continguous to where the said piping is laid.

The second large main laid in part by this Board during this year, and which will furnish a greatly increased supply of water for the high service district or Northern portion of the city, and which is proposed to be extended along Bewick, Forest, Sheridan, Palmer, St. Antoine, Holbrook and Oakland avenues, has now been under construction for the two years now last past, and we hope within six months to have completed and in operation two and one-half miles thereof.

No extension of the forty-two inch main in Jefferson avenue west has been attempted this year for the reason of lack of funds, but we hope to complete the same as planned within the next year or two at the furthest to the points which we have already advised your Honorable Body we intended to carry the same.

It is the intention of this Board not only to complete all the work already proposed and hitherto reported to you by this Board as soon as it has funds so to do. But we also plan to proceed with the construction of other large mains, reinforcing our present supply, particularly by a large main upon Hamilton avenue to the city limits on the north.

Also to lay all other extensions demanded, based upon not only our prospect of immediate use, so as not only to afford a plentitude of water for present emergency, but to build for the Detroit of one million of inhabitants which we can see housed in this metropolis within the next thirty years, thus amply providing for the future growth of this city.

And we beg to call the attention of your Honorable Body to the fact that it has ever been, as we read history, in every city of promise, the primary question, the gathering and distribution of pure water for domestic consumption. That in Detroit with its gradual but still marked ascent of the city, as it continues to grow away from the river, the difficulties of distribution are greatly increased, and the work reposed in this Board added to.

One illustration will suffice when it is remembered that Palmer Park is 70 feet higher than the pumping station, where throbs the mechanical heart of Detroit.

This means that in the distribution of water to North Detroit, besides the mechanical force necessary to overcome the resistance by friction on a level plane, a force must be added capable of raising the water sixty-five feet high in the air, at the pumping station, speaking broadly.

It being also true that the difficulties of distribution are thus much enhanced beyond what was encountered for years by this department, while its northern limits were extended but one or two miles from the water's edge, when the pipeage system was practically level. Now that this department has to force water northward over nine miles from the river and up the incline stated, the cost of water distribution for fuel and machinery is of a consequence greatly increased.

And the liberal policy adopted by this Board of generous treatment in supplying outlying territory at actual cost of construction has added to its legitimate expenditure, and may need revision to the cost of a pro rata share of the interest at least of the investment, as well as an allowance for wear and tear, all of which is now under consideration.

Again, the wisdom of man as demonstrated by the sciences of hydraulics and hydrostatics, having as yet formulated but two methods of water distribution to urban vicinities, the same being:

First The law of gravity, and

Second By direct pressure by some motive power; at this date, steam or electrical enginery.

And the situation of Detroit being especially considered, it is thought that the time is not far distant when the wisdom of adding to our water supply from spring fed inland lakes of adjoining counties will become a question of early settlement.

Lakes where the waters if but directed will flow to any part of our city of its own volition. As, if some such plan be not adopted, additional pumpage and operative machinery including enginery, will be necessary, as auxiliary to procure proper distribution of water in the northern portion of our city as it builds up, to force the water to the second, third and fourth floors of the homes, flat-buildings, and manufactories, situated therein. Thus following the example of Boston, New York and other cities that depend upon inland lakes for their entire supply of water.

Whichever scheme may be finally deemed desirable to be followed by this Commission, it is aware, must of necessity be accompanied by the disbursement of very large sums of money by this municipality, and through this Commission, its servant.

Funds to meet and defray the cost of the extraordinary improvements now contemplated by this Commission, such as the new pumping station, and the engines therein, large force mains, looking to better future distribution, cannot be obtained from the revenues of this Board.

We see and are clearly of opinion that we must have for expenditure within the next two years the sum of two millions of dollars, with which to meet and pay for contracts already entered into, and to do work which is indispensibly necessary to the successful operation of our department.

It is true that upon modest rates this department has added to the general wealth of this city ten million and a quarter of dollars of physical properties in its pipeage system, pumping station, and Gladwin Park, and other real estate owned by it.

To make improvements in the past, this Board has been intrusted with the power under the consent of your Honorable Body and the Board of Estimates, to issue its bonds to the sum of one and one-half million dollars.

This limit we wish to raise to meet the present necessities to the sum of three and one-half million dollars, or an increase in the present bonding limit of this department of two millions of dollars.

And we are here now notifying your Honorable Body of our situation, and asking you to, by resolution, join us in an appeal to the Legislature of Michigan, now about to convene, to give us this power, as something indispensible to our progress, which should not be stopped, retarded, or even checked.

We also remind you, that in making this request we are hardly keeping up with our sister lake cities.

Buffalo is contemplating and actually carrying into execution a scheme of rebuilding and extending her water plant, involving an expenditure of many more millions of dollars than we contemplate for our city.

Cleveland is upon the edge of extensive improvements.

And we suggest that it is not to be forgotten, that the metropolis of this country is now pledged to, and engaged in carrying out a scheme involving the expenditure of $164,000,000 for the creation of a new line of water supply to New York City from the Catskill Mountains—a sum so vast that the mind of the average man cannot compass a fraction thereof.

This Commission contemplates no disbursements for experiments, but in its mole-like operations, is only asking to keep up with the march for a greater Detroit.

What to it, with its face to the stern realities of Detroit's necessities, it sees clearly and unanimously are of the opinion, that what it asks is absolutely necessary for the continuance of Detroit's immediate progress.

The income of this Board is large, and above maintenance and operating expense, it does afford a sum of about $300,000 per year to be turned back into the ground in the way of new pipe extension and betterment. But it does not, and cannot be made to provide, for the additional expenditure of $1,000,000 a year, which is now the necessity which confronts us, for the next two years at least, to meet the immediate and pressing needs of the city.

Therefore we apprise your Honorable Body of the situation and ask your co-operation and help, as the direct legislative representatives of the city, to enable us to attain our end and increase our bonding limit.

And we solicit your active aid to the end that the work proposed may not fail, nor be impeded, nor the city's water supply proportionately shortened, or its peril from fire, by which it has so often been scourged, in anywise aggravated.

This Commission with constant analysis being made of the water consumed in the city's use by its citizens, has had no occasion to change its views the past year of the excellent character of the water used. As to the purity of the water supplied to its citizens we know that it is almost perfect. We are also of opinion that our predecessors were right in the selection and location of the crib, also, of the aqueduct or intake conduit, receiving the city's supply of water from the breast of Lake St. Clair and at the entrance of the Detroit River above Belle Isle, near the south bank of the American channel.

This location makes local pollution unlikely and well nigh impossible. And we certify that the examinations made in the discharge of its public duty by the Board of Health of this city, made and reported to us frequently, shows a high grade of water, as we have said, nearly perfect, consumed by Detroit's citizenship. That it is pure and wholesome, and lastly that we are convinced from Detroit citizenship's healthy condition, and freedom from the slightest epidemic attributable to water, in anywise, that, that of itself, is a conclusive proof of the healthfulness of the water consumed by it.

Detroit in reference to the healthfulness of its water supply is not at a disadvantage with any great city in the civilized world. Our consumption being such that there is practically no stagnant water in our pipeage, which is renewed every six hours, or four times per day, approximately, with live fresh water.

We also report that we have been able to give the city during the past year satisfactory water service, with no justifiable complaints during that time.

That but slight trouble has been experienced from breaks, not more than might be reasonably expected in so great a plant, and that on the whole, we congratulate ourselves, and the city, upon our good fortune, and the very prosperous year just past.

The Commission indeed was compelled to restrict for three months in the summer, viz: from June 15th to September 15th, the use of lawn or hand hose from 8 A. M. to 6 P. M. on the working days of the week, while factories were in operation.

This rule will be adherred to, and necessarily enforced with greater stringency, the ensuing year. But in all reasonable ways, the consumers' desire for water, needful, or fanciful, is complied with, the Commission only objecting to prodigality and waste.

The Board is of opinion that all business plants consuming water should be metered, also all flat buildings. There are now in use 8,827 meters, actually in service. A voluntary gain of 10% in the past year. *Water meters are eminently fair, and it is a demonstrated fact, that no water meter ever goes fast.* It registers accurately, or goes slow, so that the party metered is absolutely assured that he is not wronged by its measurement.

The total receipts of the Commission for the year has been $1,117,380.04, made up as follows:

From water rates	$813,116.13
Miscellaneous	185,552.16
General tax levy	75,000.00
Village extensions	33,367.75
Other sources outside the city	10,344.00

This has been disbursed as follows: Operation and maintenance, $205,660.83; for construction, $756,312.69; Hurlbut Fund, $4,683.27; loan, $50,000.00; interest, $46,027.50; real estate, $16,442.60; total, $1,079,126.89.

Until recently six-inch pipe mains have been used by this department for the general distribution of water in this city, and was the lowest and standard measurement of new pipe placed in service. And ten inch has been laid in streets which need exceptional quantities of water for fire protection.

Eight inch mains are now used, instead of six, upon many distributing streets, increasing the amount of water accessible about twice for better fire protection; and twelve inch pipes are now used instead of ten. The use of the ten inch pipe having been almost entirely discontinued and abandoned. In order that the manufacturing districts may have sufficient water for first-class fire protection, between four and five miles of eight inch and twelve inch pipe has been laid the past year, to obtain complete, and much to be desired, an ample fire protection.

This department, at a cost of $47,026.77, upon such streets, as we have said as Fort street East, Monroe avenue, and other streets, replaced, strange as it may seem, four inch pipes, which our predecessors in office placed therein between Randolph and Russell streets, a location now most closely built up with residences, business places and large manufactories, all of which but shows the growth of Detroit, and the necessity of looking a long distance into the future in providing for ample pipeage.

The demand for sanitary drinking fountains has been so great the past year that it has been impossible to place them as fast as petitions for them have been received and granted. *They are distinctly a success.* And it is with pleasure this Commission learns that many other cities have adopted this inexpensive fountain upon Detroit's initiative, and because of their intrinsic utility for all, as is demonstrated by their use in our streets, and elsewhere, where in service, from April 1st, to December 15th, of the past and other years since their installation, the total number now in use in Detroit being 78.

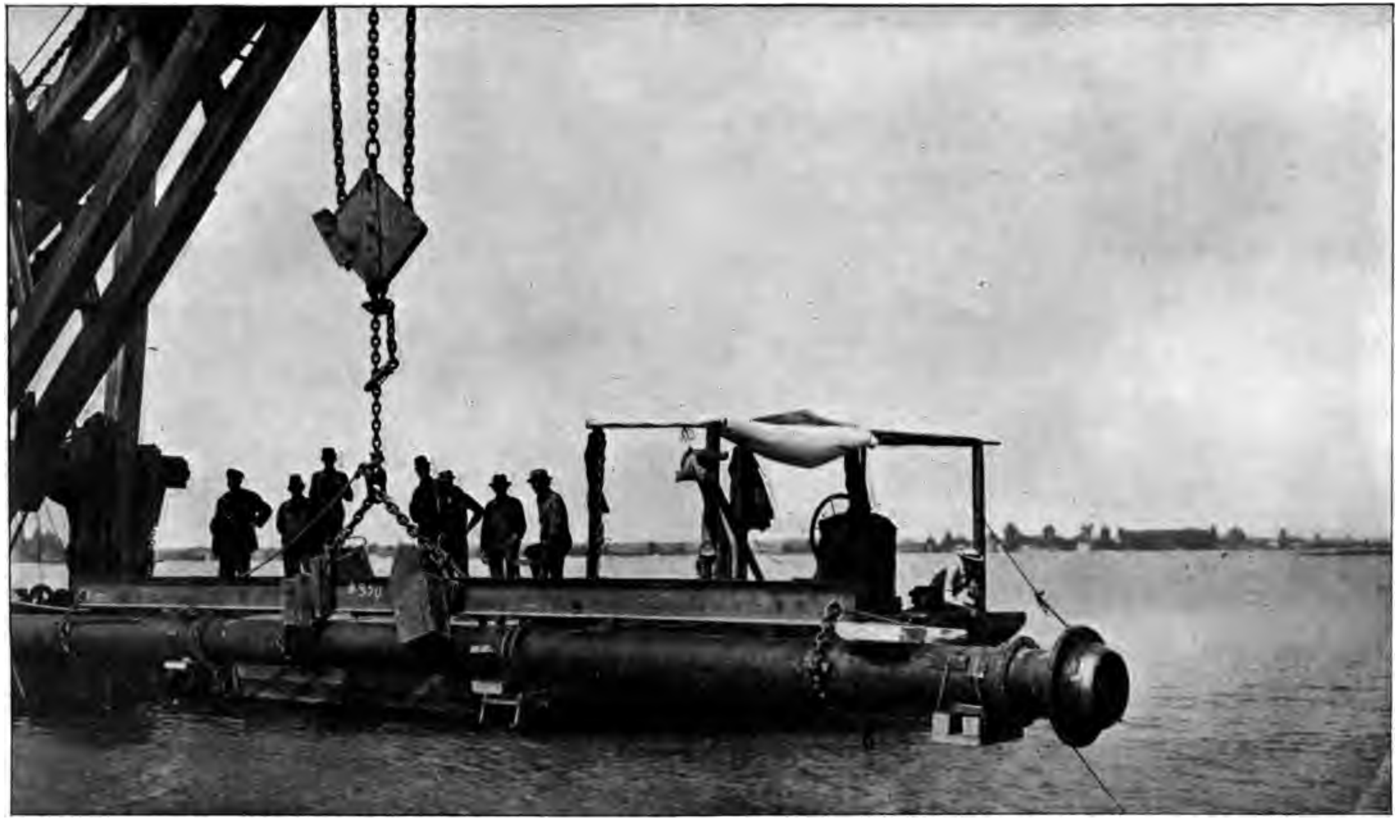
This Commission also reports that in order to be abreast with its work, and to maintain the up-keep of its plant, it has during the past year, made large improvements at the Storage Yard, upon Orleans street and Erskine street, tearing down and abandoning substantially all the wooden buildings upon the property, and replacing the same with substantial one and two story brick buildings, which will last as a credit to the Department and the city for many years. We have in this way destroyed an eyesore in the community, and put in its place seven durable brick structures, so that we are now equipped at the Storage Yard for efficient business. We also propose in the near future to extend and improve our railroad trackage therein.

Accompanying this report are detailed statements and reports of this Commission's department heads, in which will be found in detail, all operations and transactions incident to the construction and operation of the plant under the management of the undersigned for the fiscal year ending June 30th, 1910, now last expired. An examination of them, which is invited, will fill in the detail of the matters which we have necessarily referred to generally in our report but which we have accompanied with an argument for and solicitation of your assistance toward the end desired, viz., the increase legislatively of the bonding limit of this Department by $2,000,000.

All of which is respectfully submitted.

FRED J. CLIPPERT,
JAMES H. POUND,
BASIL A. LEMKE,
JAMES WILKIE,
JOHN GILLESPIE,

The Board of Water Commissioners of the City of Detroit.



LAYING 12 INCH PIPE TO BELLE ISLE PARK

REPORT OF THE SECRETARY.

DETROIT, MICH., JULY 1ST, 1910.

To the Honorable the Board of Water Commissioners of the City of Detroit

GENTLEMEN:—I beg to submit herewith a statement of receipts and disbursements of this department for the fiscal year ending June 30th, 1910.

Respectfully,

BENJ. F. GUINEY,
Secretary.

RECEIPTS.

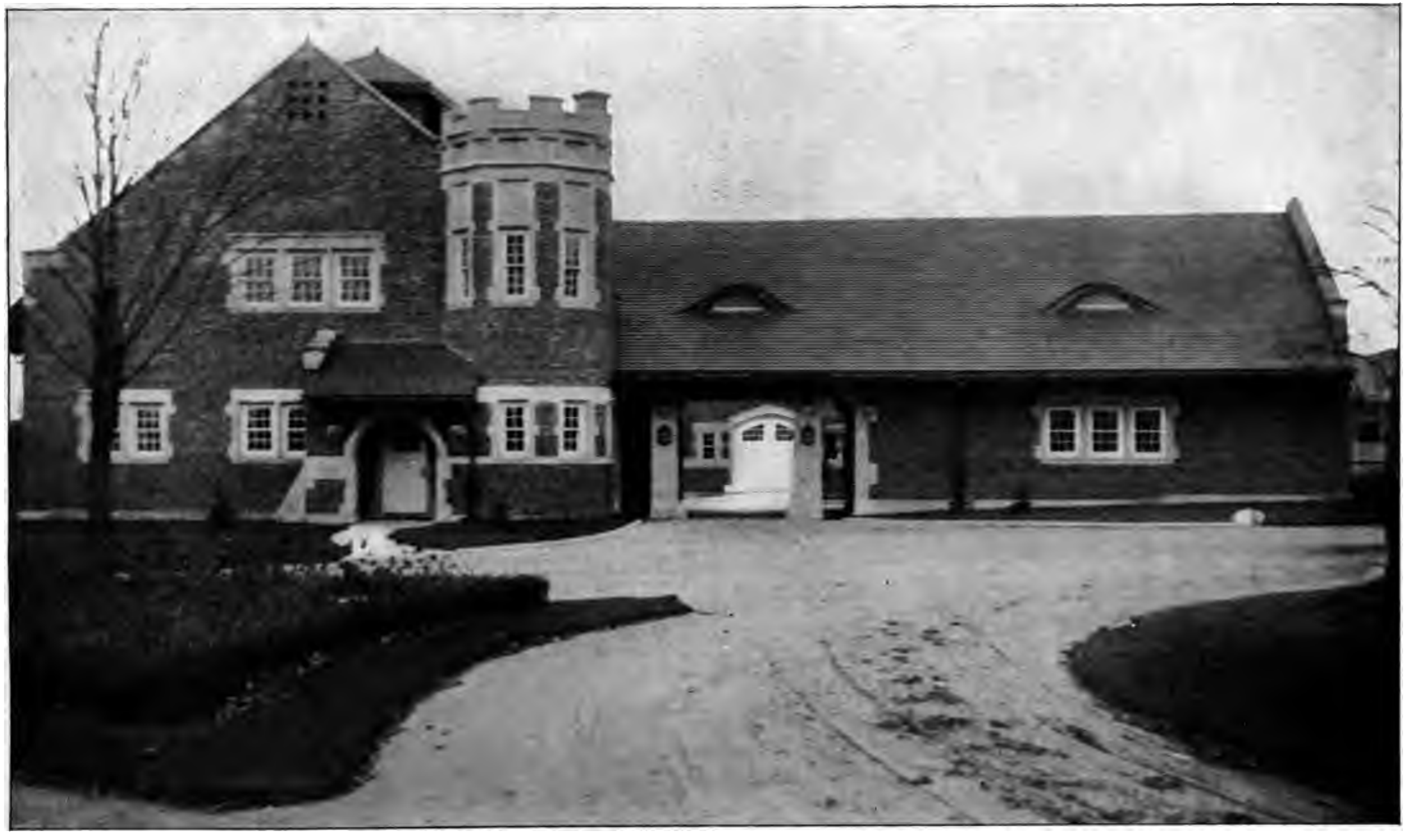
Wates rates assessed	$494,720.16
Water rates metered	318,395.97
Percentage	8,814.34
Shutting-off and letting-on	412.17
Service cocks, permits	14,474.00
Service cocks, labor and material	1,180.28
Service extensions	30.14
Plumbers' license	521.00
City of Detroit	75,000.00
Real estate, revenue and expense	1,350.00
Meter, labor and material	542.49
Meter repairs and expense, labor and material	15.35
Pumping water, material	6.00
Pumping works, material	226.75
Office	1.00
Horse expense	3.00
Iron pipe, material and labor, including subway work	35,840.14
Bonuses	2,344.83
Engineering	51.98
Village of Ecorse, estimates laying pipe	1,104.00

Village of Highland Park, estimates laying pipe	19,700.75
Village of Hamtramck, estimates laying pipe	3,745.00
Village of River Rouge, estimates laying pipe	6,818.00
Village of St. Clair Heights, estimates laying pipe	2,000.00
Acme White Lead & Color Works, estimates laying pipe	1,543.00
H. O. Walker and Estate of Robt. E. Walker, estimates laying pipe	4,626.00
Lozier Motor Co., estimates laying pipe	3,204.00
North Woodward Avenue Land Co., estimates laying pipe	5,610.00
Wolverine Construction Co., estimates laying pipe	220.00
F. S. Girardin Estate, estimate laying pipe	838.00
Glass Enamel Package Co., estimate laying pipe	133.00
Bonded indebtedness	100,000.00
Interest on General Fund	2,453.25
Interest on Sinking Fund	6,807.70
Interest on Hurlbut Fund	14.99
Hurlbut Fund from Trustees	4,632.75
Total receipts	$1,117,380.04

DISBURSEMENTS.

Office (Operation)—

General manager, secretary and clerks	$ 29,113.26	
Watchmen and janitor	2,196.00	
General work and carpenter	1,541.07	
Books, printing and stationery	1,908.71	
Telephone rental	270.00	
Advertising and subscription	171.96	
Stamped envelopes and postage	586.30	
Towel supply	101.75	
Street car tickets	15.00	
Ice	143.52	
Coal	302.51	
Employes' surety bonds	156.25	
Gas	14.95	
Still Alarm	73.75	
Horse care	105.00	
Adding machines	676.20	
Miscellaneous	232.99	
Total		$ 37,609.22



Barn and Miscellaneous Cover

Service Connections and Leaks (Operation)—

Superintendent, inspection and labor	$ 16,302.55	
Service cocks, sleeves and valves	4,507.35	
Tools and repairs	394.01	
Pipe and fittings	110.31	
Printing and stationery	90.25	
Telephone rental	28.00	
Car tickets	230.00	
Packing and waste	9.15	
Rubber boots	6.25	
Miscellaneous	5.64	
Total		$ 21,683.51

Pumping Water (Operation)—

Engineers, firemen, coal passers	$ 42,881.12	
Coal	46,452.93	
Unloading coal	4,332.80	
Boiler and engine supplies and repairs	3,371.81	
Engine oil and grease	853.65	
Waste, packing and rags	750.56	
Boiler inspection and inspection premium	33.00	
Tools, fittings and repairs	804.91	
Telephone rental	63.00	
Paint, oil and glass	344.59	
Printing and stationery	51.70	
Ice	91.52	
Towel supply	47.61	
Horseshoeing and harness	28.75	
Horse feed and bedding	36.28	
Lumber	30.50	
Freight and express	7.79	
Hose and fittings	69.42	
Wagon repairs	52.05	
Electric fixtures, etc	94.79	
Coal testing machine, etc	132.14	
Miscellaneous	296.41	
Total		$100,827.33

Repairing Leaks (Operation)—

Superintendent, clerk and labor	$ 1,775.47	

Phone rental	110.00	
Rubber boots	11.30	
Inspection and repaving	77.62	
Miscellaneous	5.50	
Total		$ 1,879.89

Meter Repairs and Expense (Operation)—

Superintendent and labor	$ 1,834.50	
Fittings	1,573.37	
Total		$ 3,407.87

Percentage—

Superintendent and labor	$ 6,927.84	
Total		$ 6,927.84

Inspection—

Superintendent and inspectors	$ 8,015.79	
Car tickets	200.00	
Printing	19.00	
Electric lamps	43.55	
Total		$ 8,278.34

Wagon and Harness—

Harness and repairs	$ 527.49	
Trucks, wagons and repairs	663.94	
Runabout, pumping station	60.00	
Total		$ 1,251.43

Office Furniture and Fixtures—

Furniture and fixtures	$ 66.86	
Electric fixtures and repairs	300.23	
Fittings, hardware, etc.	39.21	
Alterations, electric service and fittings	197.43	
Total		$ 603.73

Pumping Works, "Grounds Only" (Operation)—

Superintendent and labor	$ 10,141.04	
Telephone	30.00	
Towel supply	4.75	
Hose and fittings	38.00	

Green and Palm House alterations	682.92	
Lumber	13.75	
Road digger and weed cutter	173.11	
Tools, pipe, fittings, etc	176.93	
Horseshoeing, bedding and feed	53.90	
Printing	3.80	
Ice	76.60	
Paint, oil and glass	251.08	
Seed and pots	321.75	
Car tickets	4.00	
Sod	50.00	
Miscellaneous	86.70	
Total		$ 12,110.70

Iron Pipe (Construction)—

Superintendent and clerks	$ 8,239.92
Foremen	6,850.40
Watchmen, teamsters and bricklayers	37,383.31
Laborers	164,879.06
Iron pipe	270,535.59
Special castings	18,157.36
Gates, valves and hydrants	18,516.91
Pig lead, lead pipe and solder	11,014.76
Sand, brick, cement and stone	7,836.72
Lumber	4,223.36
Coal	1,357.05
Tools and repairs	1,092.94
Lanterns, globes, nails and fittings	1,029.60
Iron beams and rails	960.11
Car tickets	280.00
Telephone rental	486.12
Books, printing and stationery	856.78
Hose and couplings	484.00
Inspection and repaving	8,317.70
Rubber boots and repairs	244.86
Paving blocks	82.08
Packing, waste, rope and rags	704.87
Oil and gasoline	415.01
Paint and glass	47.52
Advertising	6.75

Still alarm	61.25	
Freight, express and telegrams	993.57	
Air valve	238.00	
Physician and hospital services	170.25	
Towel supply	43.50	
Ball joints, Belle Isle line	1,575.00	
George Lockerbie, on account Belle Isle line	953.60	
Ice	19.40	
Automobile fittings and repairs	603.32	
Refund	116.86	
Protecting railroad tracks	306.13	
Drinking fountains and fixtures	335.67	
Miscellaneous	574.26	
Total		$569,993.59

Horse Expense, Iron Pipe (Construction)—

Oats, hay and bedding	$ 2,516.74	
Shoeing	463.12	
Purchase of horses	1,365.00	
Doctors' services and drugs	101.26	
Total		$ 4,446.12

Meter Construction—

Superintendent, foremen and laborers	$ 5,261.87	
Meters	15,241.19	
Special castings and fittings	198.85	
Telephone rental	45.00	
Printing and stationery	49.20	
Packing and rags	5.05	
Gasoline	6.91	
Horseshoeing and harness repairs	24.95	
Tools and repairs	18.88	
Bicycle repairs	9.00	
Express and freight	90.37	
Miscellaneous	1.69	
Total		$ 20,952.96

Engineering—

Civil engineer and assistants	$ 19,659.86	
Tracing cloth and paper	184.61	

Printing, stationery and maps	273.09	
Street car tickets	201.00	
Telephone rental	51.00	
Instruments, tools and fittings	279.42	
Postage	20.00	
Camera supplies	83.50	
Express and freight	20.63	
Subscription and books	59.27	
Electric power and electric fixtures	61.44	
Towel supply	7.13	
Miscellaneous	46.09	
Total		$ 20,947.04

Pumping Works (Construction), New Addition—

Superintendent and labor	$ 70,476.37	
Telephone rental	13.50	
Tools, pipe, fittings, nails, valves and iron	1,860.98	
Paint, oil and glass	42.38	
Printing	169.10	
Pipe covering, rope, packing and waste	279.08	
Concrete mixer, engine and boiler	1,596.17	
Electric motor and fixtures	232.04	
Boiler inspection	55.32	
Hose and fittings	121.13	
Piles	2,481.90	
Freight charges	1,231.33	
Advertising	132.32	
Oil and gasoline	150.24	
Sheet lead	266.98	
Hoisting engine, derrick, irons, etc	1,453.43	
Architects estimate (Smith, Hinchman & Grylls)	7,908.75	
Coal and Coke	188.18	
Roofing	62.25	
Pipe and cartage, iron beams and rails	5,437.32	
Installing electric light	391.03	
Installing heating system, office	152.06	
Concrete steel	6,809.85	
Canvass covers	204.80	
Rubber boots	70.12	
Miscellaneous	150.47	
Total		$122,417.84

Pumping Works (Construction), "Old"—

Superintendent and labor	$ 7,055.72	
Cement, sand and stone	56.89	
Paint, oil and glass	6.45	
Iron, tools and fittings	208.47	
Portable tracks, coal conveyor and cars	1,199.92	
Lumber	47.19	
Roofing and sheet metal work (barn), Voigt & Sexauer	1,346.60	
Heating system, Jacob Zerga (barn)	586.00	
Painting and glazing (stable), Anderson & Pipp	366.00	
Mason work (stable), John Finn	4,790.13	
Plumbing	132.21	
Plumbing, electric wiring and construction, Vinton Co.	658.00	
Painting office and engineer's house	263.68	
Iron work (stable), Henry B. Lewis	813.88	
Miscellaneous	24.00	
Total		$ 17,555.14

Hurlbut Fund (Independent)—

Librarian and assistants	$ 2,018.19	
Superintendent and laborers	2,655.36	
Subscription	8.22	
Miscellaneous	1.50	
Total		$ 4,683.27

Interest—

Coupons	$ 45,677.50	
Total		$ 45,677.50

RECAPITULATION OF EXPENDITURES, FOR OPERATION, MAINTENANCE, CONSTRUCTION AND INDEPENDENT.

For Operation and Maintenance—

Office	$ 37,609.22
Service connections and leaks	21,683.51
Pumping water	100,827.33
Repairing leaks	1,879.89
Meter repairs and expense	3,407.87
Percentage	6,927.84

Inspection	8,278.34	
Wagon and harness	1,251.43	
Office furniture and fixtures	603.73	
Real estate, revenue and expense	6,771.58	
Horse expense, service connections and repairing leaks	3,271.19	
Pumping works, grounds only	12,110.70	
Interest, loan account (General Fund)	1,038.20	
Total		$205,660.83

For Construction—

Iron pipe	$569,993.59	
Iron pipe, horse expense	4,446.12	
Meter	20,952.96	
Engineering	20,947.04	
Pumping works (old)	17,555.14	
Pumping works (new)	122,417.84	
Total		$756,312.69

For Independent—

Hurlbut Fund	$ 4,683.27	
Interest	45,677.50	
Real estate	16,442.60	
Loan account	50,000.00	
Interest, Note Sinking Fund	350.00	
Total		$117,153.37

REAL ESTATE, REVENUE AND EXPENSES.

Insurance premiums	$ 316.94
Lumber	932.98
Pipe fittings	993.10
Paint, oil and glass	459.43
Marble work, toilet room, Engineering Department.	277.08
Plastering	87.00
Cement, brick, sand and stone	957.01
Painting office	587.50
Iron roofing and repairing roofs	1,741.54
Stone sills	47.75
Closets and fittings	168.46
Iron beams	91.14

Radiators and valves	71.65	
Miscellaneous	22.00	
Total		$ 6,771.58

Real Estate—

Payment on land contract, J. E. Edwards Estate	$15,791.60	
Interest on land contract, J. E. Edwards Estate.	181.25	
Commission purchasing lot No. 85, Bellevue Ave.	67.50	
Appraising property Water Works additional grounds	400.00	
Recording deed	2.25	
Total		$ 16,442.60

Horse Expense, Service Connections and Repairing Leaks (Operation)—

Oats, hay and bedding	$ 2,516.92	
Shoeing	462.03	
Doctor's expenses, drugs	97.24	
Horse care	195.00	
Total		$ 3,271.19

RECAPITULATION OF EXPENDITURES.

Total Operation	$205,660.83
Total Construction	756,312.69
Total Independent	117,153.37
Total	$1,079,126.80

CASH STATEMENT FOR YEAR ENDING JUNE 30th, 1910.

		DR	
Cash on hand, June 30th, 1909		$ 3,398.15	
Cash in bank—			
General Fund	$ 17,974.31		
Sinking Fund	2,910.85		
Hurlbut Fund	68.53		
Secretary Fund	1,000.00		
		$ 21,953.69	
Total receipts		1,117,380.04	
			$ 1,142,731.88
		CR.	
Cash on hand, June 30th, 1910		$ 4,859.86	
Cash in bank			
General Fund		18,671.08	

Sinking Fund		39,041.05	
Hurlbut Fund		33.00	
Secretary Fund	$1,035.00		
Outstanding check	35.00		
		$ 1,000.00	
Total disbursements		1,079,126.89	
			$ 1,142,731.88

The American Exchange National Bank.

Detroit, Mich., July 1st, 1910.

Benj. F. Guiney, Secretary, Board of Water Commissioners of the City of Detroit.

Dear Sir:—This is to certify that the amounts of balances in this bank to the credit of the Board of Water Commissioners of the City of Detroit, at the close of business June 30th, 1910, were as follows:

General Fund	$18,671.08
Sinking Fund	39,041.05
Hurlbut Fund	33.00
Secretary Fund	1,035.00

Yours truly,

(Signed) CHAS. S. HOWARD,

Auditor, American Exchange National Bank,
Detroit, Mich.

ESTIMATED VALUATION OF WORKS.

Real Estate (estimated valuation)	$ 695,402.60
Buildings, docks, basins, tunnel and crib	2,905,104.03
Water pipes in use	6,601,844.71
Office furniture and fixtures	14,613.83
Meters in use	145,004.39
Tools and Material on hand—	
In office of Civil Engineer	32,217.27
Inspection Department	135.00
In Meter Department	2,454.00
In Pumping Works Department	14,624.71
In Hurlbut Fund Department	2,989.02
At Storage Yards	254,237.17
At Emergency Station	7,574.86
Total	$10,676,201.59

The following table shows the dates of issue and amount of bonds of this department outstanding at this date. The total amount issued by the Board during its existence is $3,150,000.00, of which $300,000.00 were refunded and $1,570,000.00 redeemed, leaving a balance due of $1,280,000.00.

Respectfully submitted,

BENJ. F. GUINEY,
Secretary.

REPORT OF THE GENERAL MANAGER.

DETROIT, MICH., JUNE 30TH, 1910.

To the Board of Water Commissioners of the City of Detroit.

GENTLEMEN:—I herewith submit my reports as General Manager for the year ending June 30th, 1910, one in detail for filing, which necessarily covers a great deal of matter covered in detail by the reports of department heads, and this general summary to prevent repetition.

During the year twenty-eight miles of water mains of various sizes were laid and during the period covered by this report no serious breaks occurred.

Work on foundation of new engine building at Gladwin Park has progressed steadily.

I beg to refer you to the detailed reports accompanying this short report, as well as to my own detailed report, of the Secretary, Civil and Mechanical Engineers, and the Superintendent of Meters and Extension, for the details of the work initiated by the Board, and carried on to its varied stages of completion.

From these reports it will be evident that the work of this department of the City Service has progressed in an even and satisfactory manner.

Respectfully submitted,

H. S. STARKEY,
General Manager.

REPORT OF THE CIVIL ENGINEER.

DETROIT, MICH., JULY 1ST, 1910.

To the Board of Water Commissioners of the City of Detroit

GENTLEMEN:—Your Civil Engineer hereby respectfully submits a report of the work done by and under his direction, for the year ending June 30th, 1910. This embraces all operations carried on by or at the

Civil Engineering Department,
Construction Department and Storage Yard,
Emergency Station and Intake Crib, and
New Pumping Station.

PRESSURES.

The average water pressures for the year have been about the same as during the previous year, except in the Northern portion of the city, and in Highland Park, where pressures have been below those of 1908-9. At the pumping station the average pressure for the low service decreased from 55.06 to 53.11 lbs., and increased for the high service from 67.08 lbs. in 1908-9 to 71.75 lbs. in 1909-10. The average pressure at the water office increased from 27.82 to 28.11 lbs.; at engine 29, at Solvay avenue and Jefferson avenue West, the pressure decreased from 30.51 to 30.29 lbs.; at the storage ward, at Orleans and Erskine streets, the pressure increased from 17.73 to 19.12 lbs.; at engine 21, on Cass avenue, near Amsterdam avenue, the pressure decreased from 28.70 to 28.31 lbs., and at engine 24, on Mott avenue, near John R street, the pressure decreased from 27.33 to 26.33 lbs. It thus appears that, while the pressure on the pumps supplying the low service district, and this district includes 80 per cent. of the population and manufacturing plants, was reduced 2.05 lbs., the water was delivered to the consumer at about the same pressure as during the preceding year; and that while the pressure on the pumps supplying the high service district was increased 4.67 lbs., the water was delivered to the consumer at about one pound less pressure than during 1908-9. The decrease in friction in the mains supplying the low service district is due to further construction of the 48-inch main in Jay and High streets, and the friction in the high service mains will continue to increase until the new main now being laid to reinforce the supply in the Northern portion of the City is so far completed as to allow a portion of it to be used to advantage. Work on the upper main is progressing rapidly and about one and one-quarter miles remain to be laid before the first section can be put in service. Attention is called to the accompanying table for pressures in detail.

CONSUMPTION OF WATER.

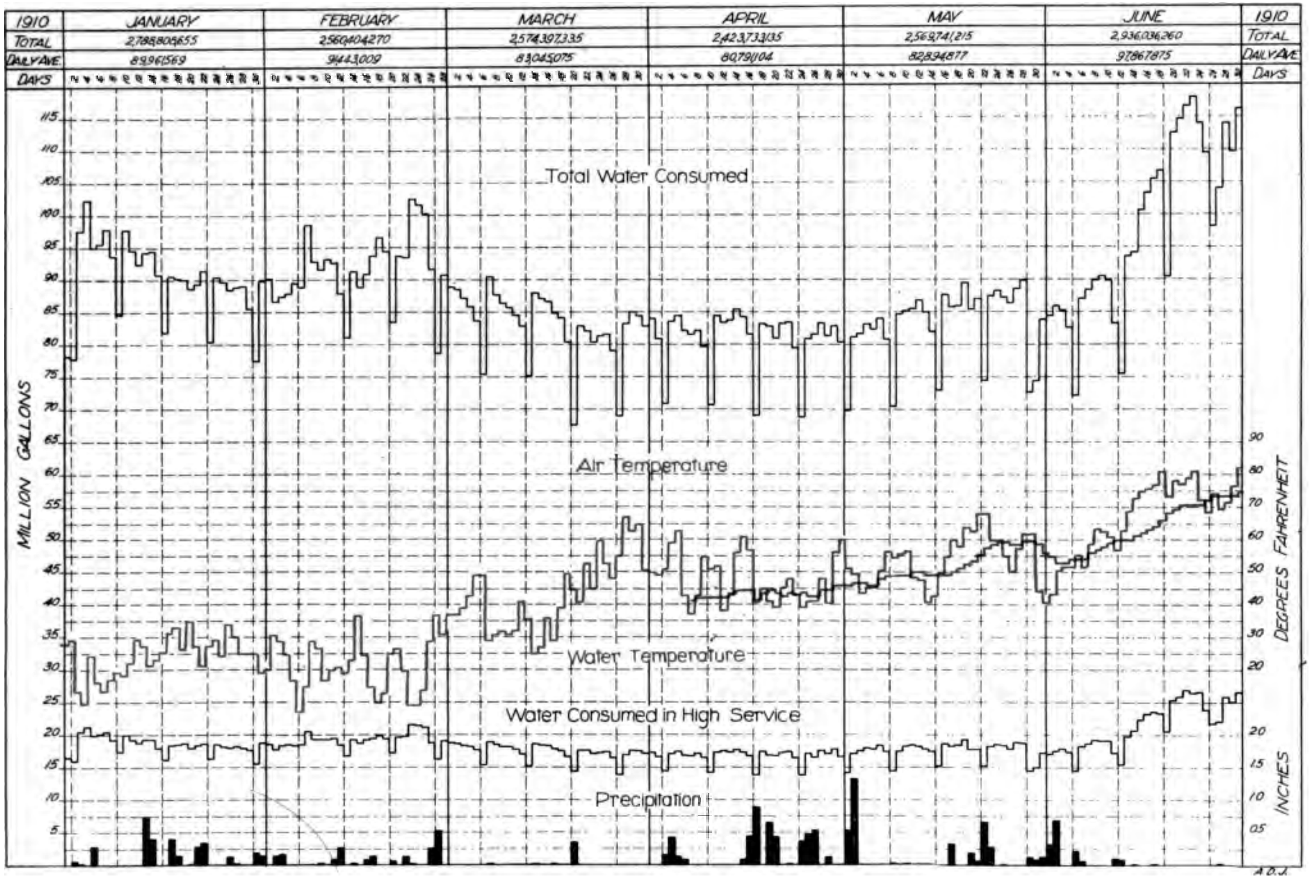
The average daily consumption of water has increased from 73,380,162 gals. in 1907-8, and 76,210,276 gals. in 1908-9, to 85,411,383 gals in 1909-10; an increase of 3.84 per cent. from 1907-8 to 1908-9, and of 12.11 per cent. from 1908-9 to1909-10.

The quantity of water used by the Detroit Fire Department at fires during the year amounted to 23,337,211 gals.

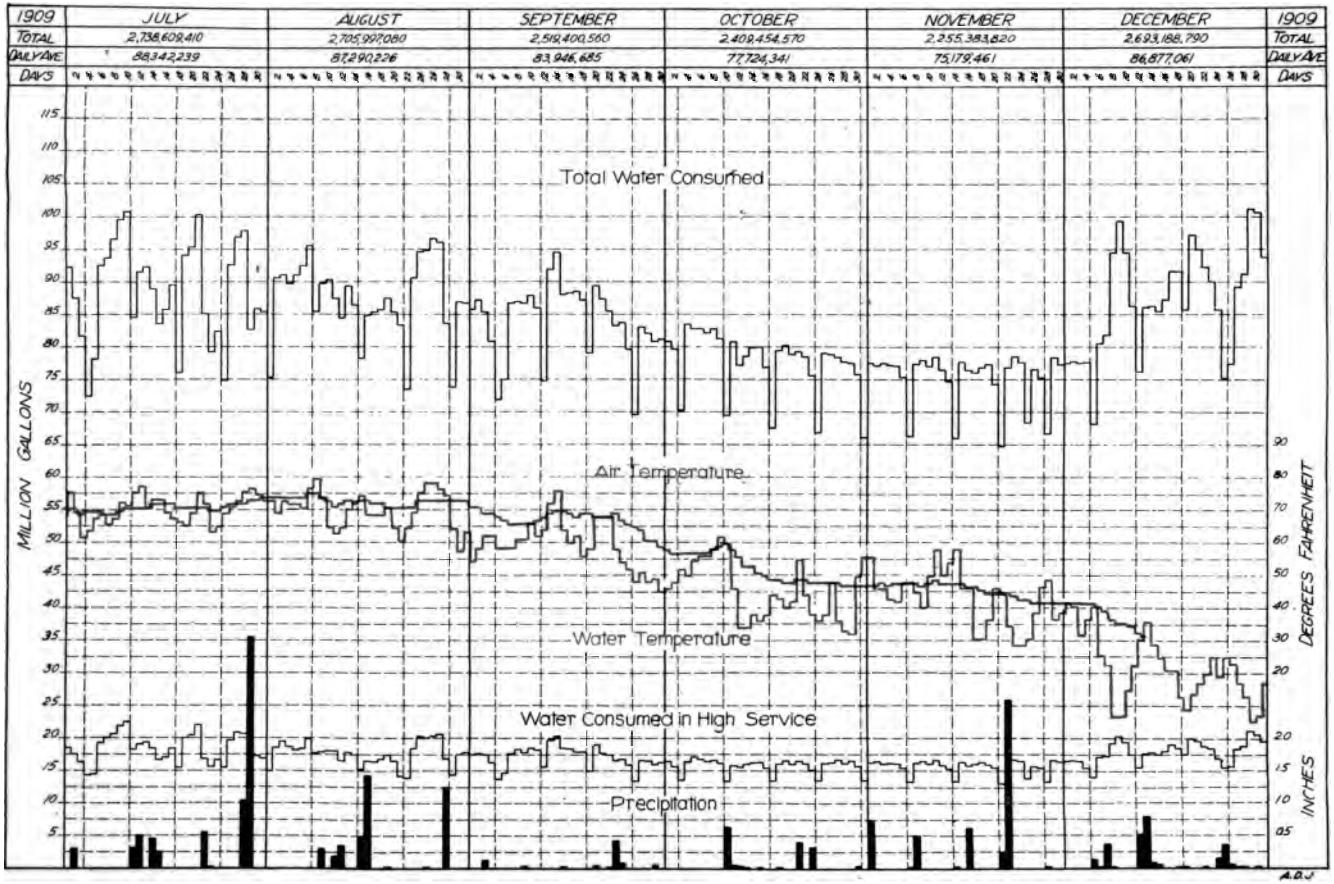
Table of Pressures.

	LOCATION OF GAUGES.	Elevat'n above City datum	Elevat'n pounds above surface pump wells 92 00 at which engine gauges are set	AVERAGE DAILY GALLONS 76,210,276 July 1, 1908, to June 30. 1909. 27,816,750,940				AVERAGE DAILY GALLONS 85,411,383 July 1, 1909 to June 30, 1901 31,175,155,100				Increase or Decrease Friction during last year		Maximum hour observed June 23, 1910. 6,096,680 Gals 12 to 1 p. m. Daily Rate 146,320,320 Gals.		Minimum hour observed Nov. 14, 1909 2,072,350 Gals. 2 to 3 a. m. Daily Rate 49 736,400 Gals.	
				Pressures, Pounds			Fric. Loss Lbs.	Pressure, Pounds.			Fric. Loss, Lbs.	Pounds		Mean Pressure Lbs.	Fric. Loss. Lbs.	Mean Pressure Lbs.	Fric. Loss Lbs.
		Feet		High.	Low.	Mean		High.	Low.	Mean		Inc.	Dec.				
Low Service	Pumping Station	92,000		60	46	55.06		61	45	53.11				59.00		48.00	
	Engine No. 32, Vanda and Jefferson	103.419	4.94	70	40	46.46	4.09	56	38	47.02	1.15		2.94	47.50	6.56	42.00	1.06
	Engine No. 26, Crane and Brinket	125.787	14.62	46	29	37.96	2.48	45	29	36.43	2.06		.42	40.00	4.38	33.50	0.12
	" No. 7, Concord near Jefferson	124.773	14.19	43	28	36.94	3.93	42	30	36.72	2.21		1.72	38.50	6.31	34.00	0.19
	Truck No. 6, Elmwood and Fort	124.495	14.07	38	21	31.90	9.09	37	22	30.67	8.38		.71	31.00	13.93	30.00	3.93
	Engine No. 19, Congress near Jos. Campau	122.473	13.19	42	29	35.57	6.30	44	30	36.34	3.58		2.72	38.50	7.31	34.00	.81
	" No. 2, Hastings near Congress	120.981	12.55	39	21	31.44	11.07	36	27	31.82	8.74		2.33	30.00	16.45	32.00	3.45
	Water Office, Randolph and Jefferson	125.176	14.36	34	19	27.82	12.88	34	20	28.11	10.64		2.24	25.00	19.64	28.00	5.64
	Engine No. 3, Griswold and Clifford	123.059	13.44	34	20	29.00	12.62	34	22	29.19	10.48		2.14	26.50	19.06	29.50	5.06
	" No. 8, Sixth and Baker	122.144	13.05	35	20	29.60	12.41	37	20	29.81	10.25		2.16	23.50	22.45	30.00	4.95
	" No. 4, Eighteenth near Howard	116.179	10.47	35	19	29.69	14.90	35	21	29.48	13.16		1.74	24.50	24.03	30.50	7.03
	Truck No. 4, Twentieth near Rose	124.825	14.21	33	13	28.07	12.78	40	15	26.93	11.97		.81	24.50	20.29		
	Engine No. 10, Sixteenth and Bagg	125.282	14.41	33	14	27.47	13.18	33	16	26.92	11.78		1.40	20.50	24.09	28.00	5.59
	" No. 15, Hubbard near Fort	114.617	9.79	38	20	31.71	13.56	38	21	31.71	11.61		1.95	25.00	24.21	33.00	5.21
	" No 29, Solvay and Jefferson W	115.052	9.98	36	12	30.51	14.57	36	20	30.29	12.81		1.73	24.00	25.02	31.00	7.02
	Truck No. 13, Lewerenz and Fort	115.564	10.20	35	22	30.33	14.53	36	15	29.50	13.41		1.12	20.00	28.80	31.50	6.30
	Engine No. 27, Junction and Rogers	113.736	9.41	38	18	32.05	13.60	40	19	31.50	12.20		1.20	23.50	25.09	33.50	5.09
	" No. 14, Scotten near Michigan	121.368	12.71	35	16	28.71	13.64	36	18	29.19	11.21		2.43	21.50	24.79	31.00	4.29
	" No. 22, Michigan near Hammond	119.444	11.88	35	12	26.92	16.26	35	13	26.59	14.64		1.62	18.00	29.12	29.50	6.62
	Truck No. 10, Sheridan and Mack	140.254	20.89	38	23	30.75	3.42	36	21	28.28	3.94	.52		30.50	7.61	24.50	2.61
	Engine No 18, Mt. Elliott near Sylvester	146.233	23.48	32	20	26.19	4.39	33	21	25.49	4.14		.25	28.00	7.52	22.00	2.52
	" No. 11, Grandy and Gratiot	143.211	22.17	36	21	27.06	5.83	36	22	28.51	2.43		3.40	30.00	6.83	24.00	1.83
	" No. 6, High near Hastings	142.631	21.92	26	11	20.67	12.37	26	16	21.50	9.69		2.68	18.00	19.08	21.00	5.08
	Storage Yard, Orleans and Erskine	150.635	25.38	23	10	17.73	11.95	25	13	19.12	8.61		3.34	19.00	14.62	18.00	4.61
	Truck No. 5, Russell and Erskine	147.742	24.13	25	12	21.15	9.78	25	13	20.53	9.45		.33	20.00	14.87	20.00	3.87
	Engine No. 5, Alexandrine near Cass	148.482	24.45	22	9	18.44	12.94	25	10	19.04	9.62		3.32	15.50	19.05		
	" No. 12 Sixteenth and Grand River	141.546	21.45	26	8	19.68	13.83	25	9	19.54	12.12		1.71	13.00	24.55	21.00	5.55
	" 31, Cobb, near West Boulevard	135.115	18.66	34	20	21.27	15.13	29	10	20.70	13.75		1.38	13.00	27.34	21.50	7.84
	" No. 20, Baldwin and Gratiot	145.368	23.10	34	20	27.98	3.98	35	20	26.77	3.24		.74	29.00	16.90	22.50	2.40
High Service	Pumping Station	92.000		95	55	67.08		100	59	71.75				100.00		61.00	
	Engine No. 18, Mt Elliott near Sylvester	146.233	23.48	62	25	39.04	4.57	56	34	40.97	7.30	2.73		52.00	24.52	37.50	.02
	" No. 23, Moran and Boulevard	154.288	26.96	45	21	32.14	7.98	49	25	32.90	11.89	3.91		37.00	36.04	30.00	4.04
	" No. 28, Riopelle and Milwaukee	155.556	27.52	43	15	28.92	10.64	45	18	28.30	15.93	5.29		24.50	47.98	27.50	5.98
	" No. 13, Russell and Ferry	157.304	28.27	37	17	28.79	10.02	40	22	28.87	14.61	4.59		28.00	43.73	27.50	5.23
	" No. 17, Cass and Amsterdam	152.825	26.33	40	15	28.70	12.05	40	17	28.31	17.11	5.06		22.50	51.17	28.50	6.17
	" No. 21, Lincoln near Piquette	154.880	27.22	37	14	29.36	10.05	41	14	28.75	15.78	5.73		20.50	52.28	28.50	5.28
	" No. 24, Mott near John R	155.855	27.64	35	10	27.33	12.11	32	10	26.33	17.78	5.67		15.00	57.48	27.00	3.36

DAILY WATER CONSUMPTION, AVERAGE TEMPERATURE AND PRECIPITATION



DAILY WATER CONSUMPTION, AVERAGE TEMPERATURE AND PRECIPITATION



FIRE PROTECTION.

As in preceding years, a large amount of construction work has been done at the request of the Detroit Fire Department. Usually the size of mains, twelve inches and less in diameter, is determined by the needs of water for fire protection. During the past year 4.4 miles of pipe, at a total cost of $47,219.77, consisting of 472 ft. of 6-inch, 16,689 ft. of 8-inch, 1,550 ft. of 10-inch, and 4,814 ft. of 12-inch pipe have been laid for this purpose.

POPULATION.*

The estimate of the population is based upon the number of families, as determined by the Board, and upon the census returns. The number of families is ascertained each year, and may be considered correct; while the number of persons per family based upon the 1900 census and the rate of change which governed previous to that census, is approximately correct.

A much closer estimate of population is possible from the water works count in Detroit than in most cities, for the reason that the clay soil which underlies Detroit prevents the use of private wells, and the water works mains are the only possible source of supply.

The total number of families as determined by the June census of the Board was 101,267, and assuming 4.57 persons per family, as indicated in the annual report for 1904, the estimated population within the limits of the city is 462,790. The count within the city limits includes 255 families which are not supplied with water. Outside the city limits there are 461 families not included in the enumeration of the villages. The estimated number of persons in Detroit supplied with water is 461,625, and as there are 87,822 taps in the city, the number of persons per tap is 5.26. Allowing 5.26 persons per tap for the villages the estimated population supplied is 18,923 in the villages, or a total of 480,548.

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*Since the above estimate of population was prepared, the U. S. census for 1910 has been published, by which the population of the City of Detroit has been found to be 465,766, which is 2,976, or less than two-thirds of one per cent. greater than the water works estimate.

New Mains.

There are 775.09 miles of street mains in service in the entire system, and the total amount expended for laying pipe inside the city limits during the year was $338,216.81. Three miles of 3-inch and 4-inch pipe have been taken out. The number of miles of each size of pipe, and the percentage each is of the total is as follows:

2 inches in diameter	0.874 miles	0.112 per cent.
3 inches in diameter	10.541 miles	1.359 per cent.
4 inches in diameter	157.000 miles	20.265 per cent.
6 inches in diameter	382.860 miles	49.395 per cent.
8 inches in diameter	93.291 miles	12.036 per cent.
10 inches in diameter	43.919 miles	5.666 per cent.
12 inches in diameter	21.746 miles	2,805 per cent.
16 inches in diameter	12.152 miles	1.567 per cent.
18 inches in diameter	.016 miles	.002 per cent.
20 inches in diameter	.074 miles	.009 per cent.
24 inches in diameter	17.016 miles	2,195 per cent.
30 inches in diameter	10.355 miles	1.355 per cent.
36 inches in diameter	1.495 miles	.192 per cent.
42 inches in diameter	18.872 miles	2.434 per cent.
45 inches in diameter	.020 miles	.002 per cent.
48 inches in diameter	4.859 miles	.626 per cent.
Total	775.090 miles	100.000 per cent.

The total capacity of all street mains is 21,343,000 gallons, or 25 per cent. of the average daily consumption.

The number of miles of pipe in use has increased from 663 in 1905 to 775 in 1910; and during this time seven miles of 4-inch pipe has been replaced; 8-inch pipe has increased from 74 miles in 1905 to 87 miles in 1910, and 12-inch pipe has increased from 10 miles in 1905 to 19 miles in 1910.

The 48-inch main in Jay and High streets was extended from Chene street to midway between Hastings and St. Antoine streets, a distance of 4,607 feet, and finally put in service July 26th, 1910.

The 48-inch and 42-inch main to supply the northern portion of the city, was completed from St. Aubin to Concord avenue, on Palmer avenue, a distance of 6,643 feet, Dec. 23, 1909.

A 48-inch main has been laid across the M. C. R. R. tracks, from Baker and 16th streets to 15th and Dalzelle streets, a distance of 1,354 feet.

There were 336 valves set during the year, making a total of 8,199 in use.

NEW PUMPING STATION.

Work on the basement of the engine room of the new pumping station was begun July 9th, 1909, by employees of the Board, working under the direction of your Civil Engineer, and has been continued without interruption throughout the year, concrete and excavation work continuing during the winter months. The first concrete was put in the forms Nov. 26th, 1909, and on July 1st, 1910, the front foundation wall, block at southeast corner, and bases for three sections at east end of water gallery were in place. There have now been removed 45,578 cu. yds. of earth, and 6,075 cu. yds. of concrete have been completed. The total cost of labor to date amounts to $81,369.16, but as the exact cost of material can better be determined on the completion of this work, an itemized statement of cost will be given in the annual report for 1911. The outside dimensions of this foundation, including the water gallery, are 307 ft. long by 120 ft. wide, and room has been provided for six pumping engines.

On November 23rd, 1909, the Bethlehem Steel Company were awarded a contract for three thirty million gallon, vertical, double flow, triple expansion, pumping engines, for the sum of $336,000, and work on the castings in the shop has already begun. The contract for the steel work in the superstructure was awarded to the Wisconsin Bridge & Iron Works, January 18th, for $60,800; and on June 30th, the contract for completing the building above the foundations was awarded to F. B. Goddard for $275,933.

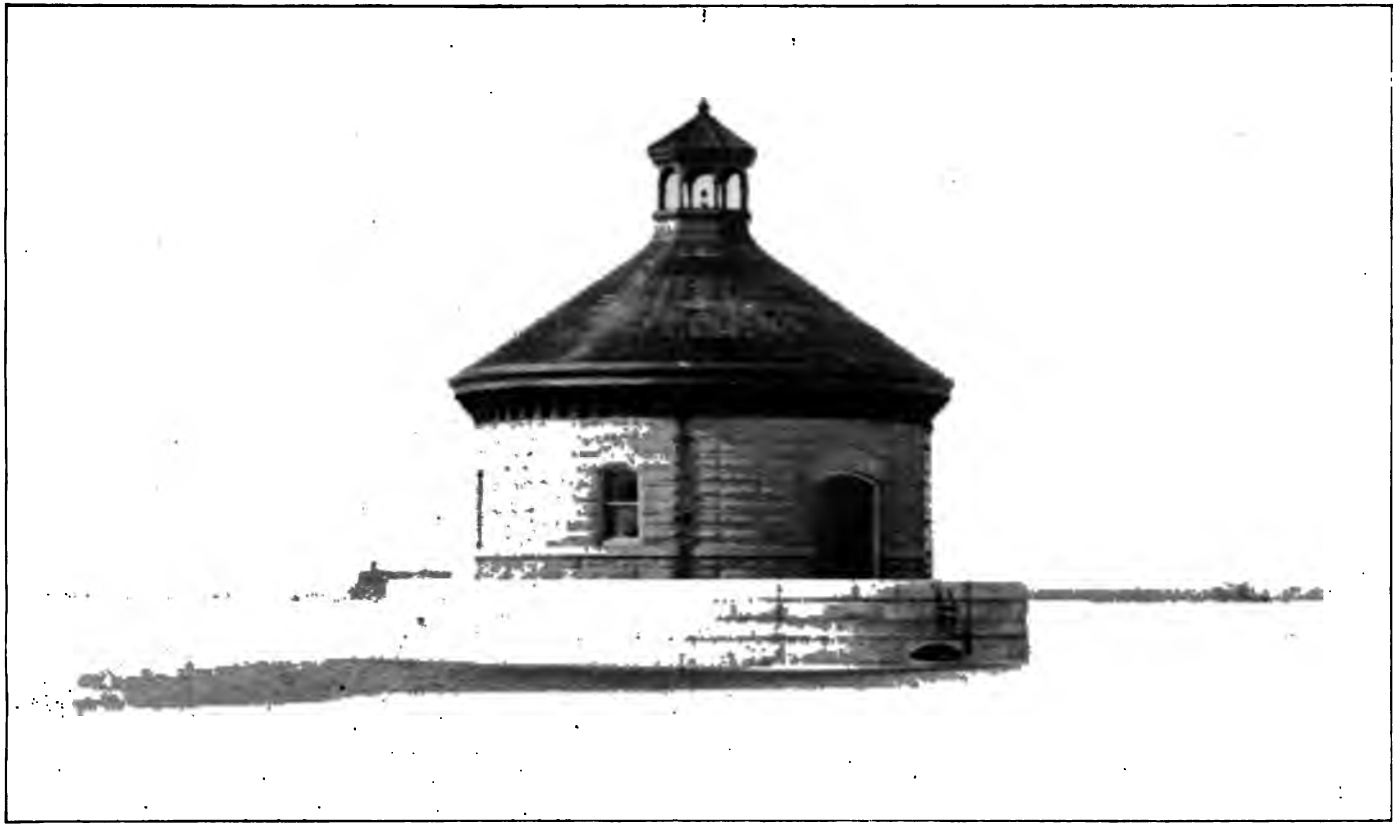
STORAGE YARD.

A two-story brick building has been constructed, providing a room for shoeing horses, tappers' tool room, toilet room, and lunch, drying and locker rooms.

The office was rebuilt and a modern fire-proof vault constructed.

A six-inch water pipe for fire protection was connected to the high service main.

A boiler house for a central heating system, a wash room for vehicles, and rooms and sheds for forty wagons were completed.



Mouth of Aqueduct

GENERAL WORK AT GLADWIN PARK.

Work on the foundations for the coal unloader and conveyor was started April 26th, 1909, and was completed, ready for the concrete bases, Feby. 8th, 1910. The work was done by employees of the Board, and consisted in changing the course of the five-foot brick conduit, which supplies water to engine No. 4, which work was finished July 22, 1909; excavating for the foundations for the unloading tower and conveyor bridge; and in order to provide a satisfactory foundation for these structures, driving 592 piles. The piles were delivered from Birmingham, Mich., and the load which they will safely carry was determnied from test piles previously driven.

A two-inch steam pipe for heating the library and green house was laid in a crock conduit from the boiler house to the library, and a one and one-half inch pipe similarly protected was laid from the library to the engineer's house and the new barn.

At the new barn a gravel concrete pavement was laid in the court, brick pavement was laid at the approaches, the adjacent lawn was graded, and cement walks laid.

A contract was entered into with George Lockerbie, on April 26, 1910, to lay a 12-inch cast iron pipe line under the Detroit River, from Gladwin Park to Belle Isle, a distance of 2,940.2 feet, at $2.98 per lineal foot. The pipe and submarine joints were furnished by the Board. The pipe was laid in sections 38.7 feet long, one section consisting of three pieces of pipe and one ball joint. Each section was carefully tested before being submerged, and as the work progressed a compressed air test was applied each 800 feet. On June 30th, 1910, 1,006 lineal feet had been laid. In the deep water between channel banks, the irregularities of the bottom were removed before laying, and dredge cuts were made in the shallow water on either side so that after the line is completed these trenches can be backfilled.

EMERGENCY STATION.

The regular force of twelve men employed at the Emergency Station was reduced to nine men, three shifts of three men each, Dec. 19th, 1909. The large air chamber and the two emergency electric trucks have been in constant service; and charging and renewing of the batteries has been done by the regular men under the direction of an assistant from the Engineering Department. The second story of the station is now used for the storage of valve patterns.

ENGINEERING DEPARTMENT.

Plans, drawings and estimates of cost were prepared for over thirty-four miles of street mains, a portion of which were 42 inches and 48 inches in diameter; and surveys were made and grades given for all pipe 12 inches or over in diameter. There are now 3,978 tracings of street intersections on file, and 2,900 locations of pipe were given out. The 200 private fire lines and 38 hydraulic elevators are inspected quarterly; and one pipe inspector and one inspector for valves, corporation cocks and special castings have attended to contracts. Besides the regular routine work this department has prepared many specifications, supervised work at the New Pumping Station, attended to complaints of water hammer, short supply and bad water, and made plans for all work at the Storage Yard.

SUMMARY OF STATISTICS.

Attached is a partial summary of statistics in the form recommended by the New England Water Works Association, compiled jointly by the Secretary and the Civil Engineer from information obtained from all departments.

Respectfully submitted,

GEORGE H. FENKELL,
Civil Engineer.

PARTIAL SUMMARY OF STATISTICS.

For the Year Ending June 30th, 1910.

In form recommended by the New England Water Works Association.

The Board of Water Commissioners of the City of Detroit, Wayne County, Michigan.

Population by census of 1900, 285,704. (Census of 1910, 465,766.)

Date of construction, 1827 to date.

By whom owned, The Board of Water Commissioners of the City of Detroit .

Source of supply, Detroit River, near Lake St. Clair.

Mode of supply (whether gravity of pumping), pumping.

PUMPING STATISTICS.

1. Builders of Pumping Machinery—
   - One 24 million gal., Compound Beam, Detroit Locomotive Works.
   - One 24 million gal., Compound Beam, Riverside Engine Works, Detroit, Mich.
   - One 30 million gal., Compound Beam, Riverside Engine Works, Detroit, Mich.
   - One 24 million gal., Triple Expansion, E. P. Allis & Co., Milwaukee, Wis.
   - Two 25 million gal., Triple Expansion, Allis-Chalmers Company, Milwaukee, Wis.
2. Description of Fuel Used—
   - Used 40,034,959 lbs. of "Meadowbrook" run of mine bituminous coal, delivered f. o. b. boat at Water Works dock at $2.61 per gross ton.

6. Total pumpage for the year, 31,175,155,100 gallons.

   Allowance for slip for three compound and one trible expansion engine, 1%.

   No allowance for slip for two triple expansion engines.

7. Average static head against which pumps work, direct pressure, no reservoir.

8. Average dynamic head against which pumps work—

   High system, 71.75 lbs., 166 feet.

   Low system, 53.11 lbs.. 123 feet.

   Whole system, 59.58 lbs., 138 feet.

9. Number of gallons pumped per pound of equivalent coal 779.

10. Duty=

$$\frac{\text{No. gals. pumped (6) x 8.34 (lbs.) x 100 x dyn. head (8)}}{\text{Total Fuel Consumed}}$$

=89,381,626

Total cost of pumping per million gallons, figured on pumping station's expenses, $3.23.

11. Cost of fuel per million gallons pumped, $1.64.

12. Total cost per million gallons raised one foot (dynamic), $0.0120.

FINANCIAL STATISTICS.

Receipts.

Balance brought forward	$ 25,351.84
(a) From ordinary (maintenance)	1,117,380.04
(b) From extraordinary receipts (bonds, etc.)	....
Total	$ 1,142,731.88

From Water Rates—		
A. Fixture Rates	$494,720.16	
B. Meter Rates	318,395.97	
C. Total from consumers		$ 813,116.13
K. From tax levy		75,000.00
M. From other sources		229,263.91
Balance forward		25,351.84
N. Total		$ 1,142,731.88

EXPENDITURES.

Water Works Maintenance—		
CC. Total maintenance		$ 205,660.83
DD. Interest on bonds		46,027.50
EE. Payment of bonds (loan)		50,000.00
Water Works Construction—		
GG. Extension of mains	$595,386.75	
II. Extension of meters	20,952.96	
JJ. Special—		
Pumping works	139,972.98	
K.K. Total construction		$ 756,312.69
LL. Unclassified expenses		21,125.87
MM. Balance		63,604.99
N. Total		$ 1,142,731.88

Disposition of Balance—

O. Net cost of Construction and Real Estate, to date	$10,303,499.40
P. Bonded debt at date	1,280,000.00
Q. Value of Sinking Fund at date, including bonds, etc.	134,041.05
R. Average rate of interest, 3½+%	

STATISTICS.

Total consumption for the year	31,175,155,100 gals.
Passed through meters	10,243,493,480 gals.
Percentage of consumption metered	32.9%
Percentage of services metered	10.0%
Perecntage of receipts from metered water	39.0%
Average daily consumption	85,411,383 gals.
Cost of supplying water, per million gallons, figured on total maintenance (item CC.)	$6.61
Cost of repairs per mile	$1.89
Number of leaks per mile	0.109
Number of meters added	871
Number of meters now in use	8,827
Number of gate valves now in use	8,199
Number of gate valves added	336

REPORT OF CHIEF ENGINEER AT PUMPING WORKS.

DETROIT, JULY 1, 1910.

To the Board of Water Commissioners

GENTLEMEN :—I have the honor to submit the Engineer's report for the year ending June 30, 1910:

The cost of fuel per million gallons pumped was $1.64, and per million gallons pumped 100 feet high was $1.20. The amount of water pumped during the year was 31,175,155,100 gallons, making the daily average 85,411,383, which is an increase of 10.76 per cent compared with the preceding year.

The total expense during the year for pumping water, including maintenance, heating station, library and greenhouses, hoisting coal, etc., was $100,559.97, thus making cost per million pumped $3.23, which is a decrease of 3 per cent of the preceding year.

The station duty of coal consumed for all purposes for the year was 88,419,926 foot pounds.

Respectfully yours,

URIAH GOULD,
Chief Engineer, Pumping Station.

Roll of Commissioners and Their Tenure of Office.

James A. Van Dyke	1853	1855	Died.
Edmund A. Brush	1853	1868	Resigned.
Henry Ledyard	1853	1859	Resigned.
Shubuel Conant	1853	1859	May 1st.
William R. Noyes	1853	1865	Resigned.
Alexander D. Frazer	1855	1871	May 1st.
Julius D. Morton	1859	1865	Died.
John V. Ruehle	1859	1861	Resigned.
Chauncy Hurlbut	1861—1863	1868—1885	Died.
Stanley G. Wight	1863	1868	May 1st.
Jacob S. Farrand	1865	1890	May 1st.
John Owen	1865	1879	May 1st.
Caleb Van Husan	1868	1872	May 1st.
Samuel F. Hodge	1871	1879	Resigned.
Elija Smith	1872	1877	May 1st.
Michael Martz	1877	1887	May 1st.
James Beatty	1879	1885	Died.
John Pridgeon	1879—1884	1886—1891	May 1st.
Marshall H. Godfrey	1884	1889	Resigned.
Edwin F. Conley	1885	1886	May 1st.
Samuel G. Caskey	1885	1895	May 1st.
Joseph Nagel	1887	1890	Died.
August Goebel	1889—1894	1897—1898	Resigned.
Henry M. Duffield	1890	1895	May 1st.
Joseph L. Hudson	1890	1894	May 1st.
Frank E. Kirby	1891	1896	May 1st.
Albert L. Stephens	1894	1897	May 1st.
D. W. H. Moreland	1894	1896	Resigned.
Clarence A. Black	1894	1894	Resigned.
Edward W. Pendleton	1894	1909	May 1st.
Darius D. Thorp	1895	1905	May 1st.
John P. Huckestein	1896	1897	Resigned.
John W. McGrath	1896	1901	May 1st.
Joseph J. Noeker	1898	1902	May 1st.
James W. Millen	1897	1898	May 1st.
James Meathe	1898	1899	Died.
Benjamin Guiney	1899	1900	Resigned.
John Zynda	1900	1908	May 1st.
Joseph J. Crowley	1901	1906	May 1st.
John Schroeder	1902	1907	May 1st.
John F. Dodge	1905	1910	May 1st.

MEMBERS OF THE BOARD 1909-1910.

FREDERICK J. CLIPPERT
BASIL A. LEMKE
JAMES H. POUND
JAMES WILKIE
JOHN GILLESPIE

The FIFTY-NINTH ANNUAL REPORT of the Board of Water Commissioners of the City of Detroit

For the Year Ending
June 30th, 1911

PRESIDENT
JAMES H. POUND.

FIFTY-NINTH ANNUAL REPORT

OF THE

[illegible]

Board of Water Commissioners

OF THE CITY OF DETROIT

TO THE

Common Council of the City of Detroit

TOGETHER WITH THE

Reports of the Officers of the Board

For Year Ending June 30th, 1911

THOS. SMITH PRESS
DETROIT

CONTENTS.

Page
Report of the Commissioners 9
Financial Report of the Secretary 17
Report of the Civil Engineer 29
Summary of Statistics 43
Report of the Chief Engineer at Pumping Works 46
Roll of Commissioners 47

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BOARD OF WATER COMMISSIONERS
OF THE
CITY OF DETROIT

MEMBERS:

JAMES H. POUND, 1912 BASIL A. LEMKE, 1913
JAMES WILKIE, 1914 JOHN GILLESPIE, 1915
GEORGE LANE, 1916

COMMITTEES:

Ways and Means	Commissioners GILLESPIE and LANE
Extension and Construction	Commissioners WILKIE and LEMKIE
Pumping Station	Commissioners LEMKE and GILLESPIE
Supplies	Commissioners LANE and WILKIE

The President is ex-officio member of each Committee.

OFFICERS:

President,	JAMES H. POUND
Vice President,	BASIL A. LEMKE
Secretary,	BENJ. F. GUINEY
Civil Engineer,	GEORGE H. FENKELL
Purchasing Agent and Paymaster	HARRY S. STARKEY
Chief Engineer at Pumping Works,	HARRY W. GOULD
Bookkeeper,	GEORGE BARRIE
Auditor,	J. W. LOEFFLER
Cashier,	D. C. GROBBEL
Ass't. Cashier	CHARLES W. KEENA
Meter Clerk,	CHAS F. GILMER
Permit Clerk,	LOUIS J. MONTGOMERY

THE BOARD OF WATER COMMISSIONERS

OF THE

CITY OF DETROIT

Rates adopted June 15th, 1909

FROM JULY 1ST, 1909,

Payable Quarterly

	Quarterly
First 30,000 gallons	**$1 75**
All in excess of 30,000 gallons	**3 cts. per M.**
Minimum rate	**1 75**

ASSESSMENT RATES

	Per Annum
For Family, household purposes, each family	**$3 20**
Stores and Offices, from	**$1 00** to **12 00**
Boarding Houses, in addition to family rate, each boarder or roomer	**40**
Estimated quantities of water, each 1,000 gallons	**07**
Building Purposes, each 1 M. brick	**03**
“ “ each 100 yards plastering	**05**
“ “ each perch stone	**01**
“ “ minimum	**50**
Automobiles, each	**1 20**

FIXTURES.

Bath Tub, for families, each	**1 00**
“ public, each tub	**4 00**
Automatic Water Closets, for family, 1st closet	**1 60**
“ “ “ each, additional	**60**
Rod Water Closets, not less than	**6 00**
Urinals, not less than	**2 00**
Wash Hand Basin, for family, each	**48**
“ “ “ for other purposes, each person	**15**
Hose Bibb or connection, Premises 30 feet front or less	**1 00**
“ “ “ “ 30 feet to 60 feet	**1 40**
“ “ “ “ 60 feet to 100 feet	**2 00**
Special rates for larger grounds.	
Fountains	**$10 00** to **20 00**
Street Sprinklers, each wagon	**50 00**

Where there is a waste of water an increase of rates will be made.

ANNUAL REPORT
OF THE
BOARD OF WATER COMMISSIONERS
OF THE
CITY OF DETROIT
JULY 1, 1910 TO JUNE 30, 1911.

TO THE HONORABLE

The Common Council of the City of Detroit.

GENTLEMEN:—The Board of Water Commissioners of the City of Detroit, respectfully submits its annual report for the fiscal year ending June 30th, 1911.

The amount of work which has been undertaken or completed during the year, has been greater than during any like period since the works were first installed. Nor is the construction and extension work likely to grow less, for if the people of Detroit are to be provided with an abundance of water for fire protection, manufacturing and commercial uses, as well as for domestic consumption, pressures must be at least maintained at their present level, and the means must be provided to furnish an abundant supply to the ever-increasing population.

This Board is now, and has been for some time, installing a system which will furnish sufficient water for a greater Detroit with one million inhabitants. The population of Detroit has increased in quite an uniform and regular manner, until it now numbers one-half a million, and if it continues to increase at the rate of sixty-three per centum for ten years, which was the rate of increase from 1900 to 1910, there will be a population of 759,200 in 1920, and of one million in 1925; while if the increase should only amount to fifty per centum per decade, a million population will be reached in 1929. In an endeavor to keep up with this remarkable growth, there has been laid forty-three miles of mains in sizes from six inches to forty-eight inches in diameter, at a total cost of $628,388.61, of which $209,435.11 was expended for labor alone.

In addition to the large amount of pipe which has been laid, an amount exceeding that laid by any city in the United States of equal size, work has progressed continuously on the new pumping station in Gladwin Park. At the beginning of the fiscal year the foundations for the new engine room were nearing completion and during the year these have been completed, the steel superstructure has been erected, and work by the general contractors, on the masonry and brick work, is progressing rapidly. Three massive concrete engine foundations have also been completed in this station, and as most of the castings for the three 30 million gallon pumping engines have been made by the contractor, it is believed there will be no delay in beginning their erection as soon as the superstructure shall be so far completed as to admit of work being done within its walls.

When the addition to the present pumping station was built in 1901, room was provided and the necessary arrangements were made for three 25 million gallon pumping engines, although but two were installed at that time. In the fall of 1910 this Board contracted for a pumping engine to occupy the place provided for it ten years ago, and this engine has been erected and is ready for operation. This station now has a normal capacity of 177 million gallons per day, and the last three pumps installed are capable of working against a water pressure of 100 pounds per square inch; but as the greatest speed which can be attained by a fleet of men-of-war can not exceed the speed of the slowest ship, so the maximum pressures at the pumping station for the low service or main portion of the city can not exceed sixty pounds, as that is the greatest pressure which the remaining pumps with 102 million gallons capacity, are capable of withstanding.

The question of an increased supply of water at the pumping station is receiving the careful consideration of this Board. The present intake tower in the Detroit River above Belle Isle and tunnel from the intake to Gladwin Park were put in operation December 18, 1905, and was conservatively assumed to have a normal capacity of 150 million gallons per day, but as the quantity which it will deliver depends ordinarily on the stage of water in the Detroit River, its actual capacity will vary from 150 to 200 millions gallons per day, and it has already delivered water at the rate of 160 million gallons. Work on another intake tunnel must be begun before many months have past; and funds for this and the necessary conduits to the pumping stations and other work and apparatus necessary to make up the equipment which will be needed to supply and pump the great quantities of water must be provided in the immediate future.

There are now about one hundred thousand service connections which draw water from the mains. One-tenth of these, and including many for manufacturing plants and places of business, have their supply metered, while the remainder are charged flat rates and use water nearly, if not quite, without restriction. It is the intention of this Board to furnish an abundance of water for all legitimate purposes and uses, and it is its purpose to meter all connections where the same can be done with profit to the City and with justice to the consumer. While it is well known that large quantities of water are wasted because of gross carelessness and negligence, but few realize the expense the Board is put to because of such extravagance. The cost of providing the necessary plant for pumping water, with present conditions, will probably exceed $20,000.00 per million gallons capacity, and if to this is added the cost of mains and other appurtenances, the cost of coal, labor and other operating expense, and the proper amount is allowed for maintenance and depreciation, it will be readily seen that the use of meters may well be justified by other reasons than that they provide an equitable method for assessment. Nor is the increase of the use of meters in Detroit exceptional, for most of the cities of the United States have been compelled, for financial reasons, to adopt them to some extent, and many use them almost exclusively.

An earnest endeavor has been made by this Board to meet the requirements of the City at large for purposes other than covered by its rates, and from which it receives no adequate return. Nearly eight per cent of all water pumped is supplied to public buildings, charitable institutions, parks, fountains, and for street sprinkling and miscellaneous public purposes. There have been laid during the year six miles of mains for better fire protection, at a cost of $82,320.83, and the size of other mains, when less than sixteen inches in diameter, has been increased in order that fire risks might be lessened.

The use of the constant flow sanitary street drinking fountains has been extended until there are now 111 in

Detroit, and it is gratifying to know that they have met with general approval. It is believed that they were first used extensively by this Board, that many cities and towns have adopted them because of their success in Detroit, and that they have had a very potent influence in the elimination of the drinking cup, which is now acknowledged as having frequently been the cause of the transmission of disease.

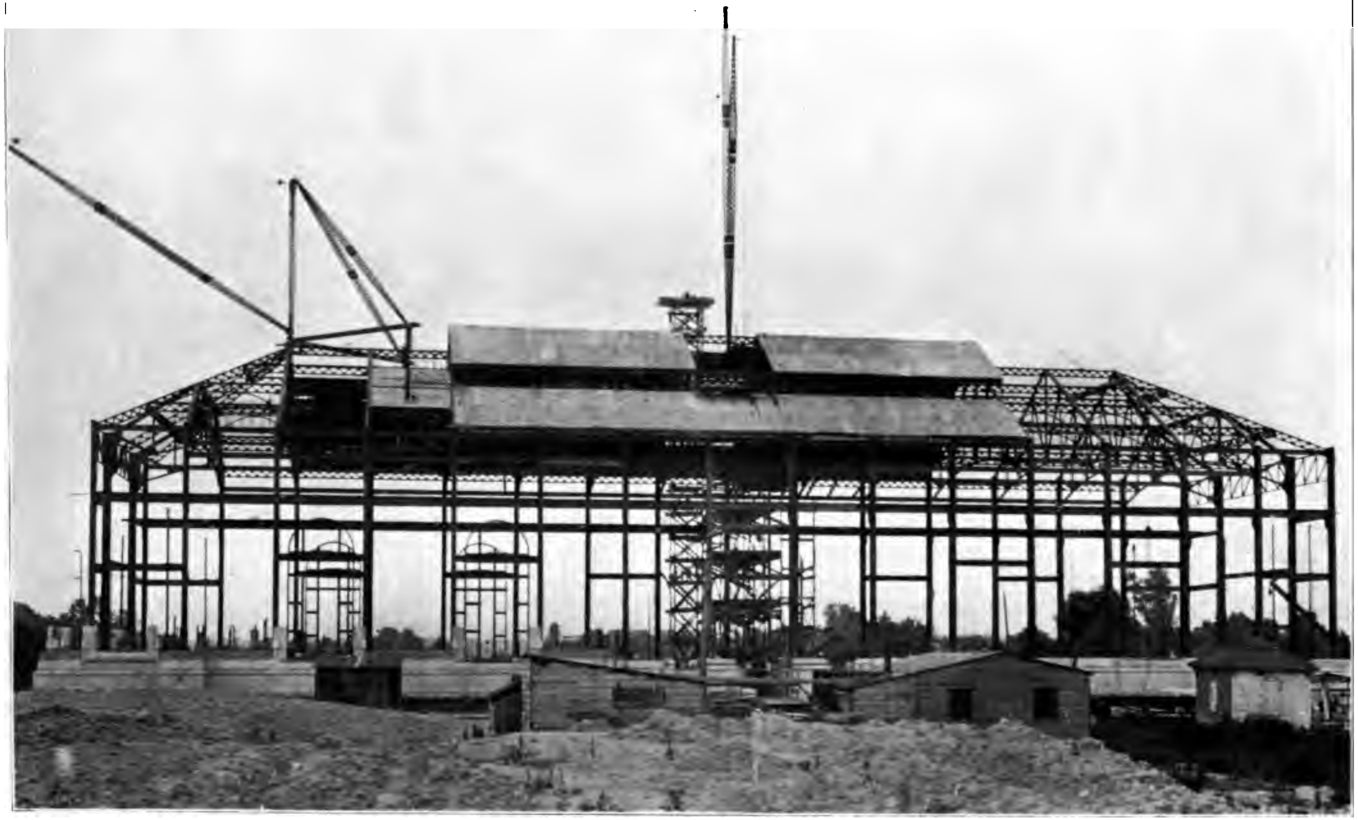
The Storage Yard of the Board at Orleans and Erskine streets, is the headquarters for all construction and repair work, and here are stored all pipe, valves, and other material. Four years ago the work of improving this yard was started, and during the past fiscal year all of the old wooden buildings and dwellings were removed, a modern brick barn, and a brick shop, have been completed, new railroad sidings and track scales have been installed, and many improvements put in which will reduce the cost and facilitate the prompt handling of material. During the past winter the work of setting, removing, repairing and testing meters was moved from the basement of the main office to the new shop at the storage yard, and repairs for the automobile trucks have since been made there.

The Board now has in use three two-passenger autos, five small auto trucks, and twenty-four horse drawn vehicles and has found it necessary to hire several additional teams. Up to the present time, the use of autos has been somewhat of an experiment, but the City has expanded to such an extent that it has been necessary, if the work is to be carried on economically, to either use automobiles or establish branch yards in various parts of the city. The latter plan has been adopted by some cities, and will probably become necessary in Detroit within a few years, but at present, at least, it is believed that the use of autos with long hauls is less expensive than would be the operation and maintenance of several branch yards.

In conclusion this Board wishes to call especial attention to the reports of the Secretary, Civil Engineer and Engineer of the Pumping Station, all of which are contained herein and from which it will be found that while the Board received $1,191,240.23 from all sources, except from the sale of bonds, the cost of operating and maintaining the entire system, including interest on bonds and loan, was $256,277.24, and that the balance $934,962.99 was invested in the system for pumps, mains and other improvements; and, as further evidence of the sound financial condition of the Board it may be seen that while the plant has an approximate value of $11,543,319.79, its outstanding indebtedness, including $20,000.00 loan from the sinking fund, amounts to only $1,365,000.00, which amount should be reduced by the value of the sinking fund, $168,314.38. A careful audit of the books by an outside competent accountant has been made for the three years ending June 30th, 1910, and all accounts have been found correct.

All of which is respectfully submitted.

JAMES H. POUND,
BASIL A. LEMKE,
JAMES WILKIE,
JOHN GILLESPIE,
GEORGE LANE.



FRONT VIEW OF NEW PUMPING STATION, JUNE 20, 1911

REPORT OF THE SECRETARY.

To the Honorable the Board of Water Commissioners of the City of Detroit

GENTLEMEN:—I respectfully submit my report as Secretary for the year ending June 30th, 1911.

The receipts as shown include the sum of $98,442.51, deposited with the Department by outlying villages and others for water main extensions beyond the City limits, and the sum of $65,000.00 received from the sale of water bonds of that amount which were purchased by the Sinking Fund of the Board.

The disbursements were proportionately increased by this latter amount and by the amount of construction work done outside the City. The sum of one hundred and sixty-four thousand five hundred ninety-one and 46-100 dollars, ($164,591.46), was paid on the New Pumping Station and thirty thousand dollars ($30,000.00), on the new Holly engine, installed in the Old Pumping Station.

RECEIPTS.

Water Rates assessed	$531,701.29	
Water rates metered	388,002.06	
		$ 919,703.35
Percentage		9,916.77
Shutting off and letting on		449.11
Service cocks, permits		19,284.15
Service cocks, labor and material		52.52
Service extensions		87.24
Plumber's license		702.45
City of Detroit		75,000.00

Real estate, revenue and expense	2,647.61
Meter, labor and material	1,721.21
Meter, repairs and expense, labor and material	122.60
Pumping works, material	139.38
Repairing leaks	129.44
Engineering, material and labor	14.90
Office	1.00
Horse, harness and wagon	291.00
Bonuses	3,946.33
Iron pipe, material and labor	46,142.42
Village of Hamtramck, estimates laying pipe	17,654.00
Village of Highland Park, estimates laying pipe	30,902.85
Village of St. Clair Heights, estimates laying pipe	3,788.00
Village of River Rouge, estimates laying pipe	4,569.00
Village of Ecorse, estimates laying pipe	750.00
Village of Oakwood, estimates laying pipe	30,547.66
U. Grant Race, Agt., estimates laying pipe	1,749.00
Hayward Realty Co., estimates laying pipe	782.00
C. H. Haberkorn, estimates laying pipe	1,049.00
R. E. Walker Est., estimates laying pipe	4,689.00
J. W. Berns, estimates laying pipe	1,314.00
Jos. H. Berry Est., estimates laying pipe	648.00
Bonded indebtedness	65,000.00
Interest on General Fund	2,664.26
Interest on Sinking Fund	5,090.83
Interest on Hurlbut Fund	42.40
Hurlbut Fund from Trustees	4,648.75
Total receipts	$ 1,256,240.23

DISBURSEMENTS.

Office (Operation)—

Office pay rolls	$ 28,995.19
Watchman and janitor	2,276.00
Carpenter and general work	1,654.73
Books, printing and stationery	1,671.77
Telephone rental	453.78
Advertising and subscription	192.10
Postage	1,070.80

Horse expense	159.30	
Coal	359.42	
Surety bonds	112.50	
Ice	82.69	
Car tickets	15.00	
Towel supply	57.70	
Gas	7.69	
Still Alarm	83.25	
Miscellaneous	316.83	
Total		$ 37,508.75
Service Connections (Operation)--		
Pay rolls	$ 11,621.92	
Service cocks, sleeves and valves	9,524.27	
Tools and repairs	200.50	
Car tickets	155.00	
Books and printing	65.00	
Miscellaneous	52.99	
Total		$ 21,619.68
Service Connections and Repairing Leaks (Horse Expense)—		
Feed and bedding	$ 2,539.03	
Shoeing	282.10	
Harness and wagon repairs	72.86	
Drugs and veterinary services	67.05	
Livery care	44.75	
Miscellaneous	80.58	
Total		$ 3,086.37
Pumping Water (Operation)—		
Pay rolls	$ 48,037.49	
Coal	49,991.35	
Unloading coal	4,938.71	
Engine oil and waste	1,641.60	
Boiler and engine supplies and repairs	3,115.95	
Valves and gauges	600.67	
Hose, fittings, rope, etc	173.74	
Tools and hardware	149.52	
Paints and oils	248.61	
Electric lamps	64.63	
Horse expense	34.75	
Printing and stationery	12.20	
Miscellaneous	393.23	
Total		$109,402.85

Repairing Leaks (Operation—		
Pay rolls	$ 4,048.30	
Miscellaneous	44.34	
Total		$ 4,092.64
Meter Repairs and Expense (Operation)—		
Pay rolls	$ 2,916.35	
Fittings	1,830.42	
Miscellaneous	91.82	
Total		$ 4,838.59
Percentage—		
Pay rolls	$ 5,351.67	
Total		$ 5,351.67
Inspection—		
Pay rolls	$ 7,844.66	
Car tickets	400.00	
Electric lamps	54.20	
Printing	18.50	
Total		$ 8,317.36
Wagon and Harness—		
Harness and wagon repairs	$ 312.25	
Total		$ 312.25
Real Estate, Revenue and Expense—		
Labor	$ 184.78	
Decorating and repairing buildings	210.20	
Electric fixtures and wiring	280.19	
Sand and cement	622.96	
Pipe and fittings	456.61	
Paint, oil and glass	162.85	
Lumber	661.07	
Iron beams	245.76	
Roofing	124.85	
Hardware	92.46	
Repairs to crib	123.00	
Wayne County Treasurer, taxes	359.11	
Miscellaneous	49.36	
Total		$ 3,573.20
Iron Pipe (Construction)—		
Pay rolls	$ 6,839.35	
Foreman and laborers	275,225.26	

Watchmen, teamsters and mechanics	58,900.82
Iron pipe	212,207.65
Special castings	32,866.41
Gates, valves and hydrants	29,841.29
Lead and solder	27,556.19
Structural iron, iron beams, rails, etc	3,961.98
Brick and lumber	11,785.32
Sand, stone, cement, etc	9,028.54
Inspection and re-paving	9,258.91
Coal and ice	1,553.92
Refunds	5,106.20
Geo. Lockerbie on Belle Isle Contract, submerged pipe	8,161.32
John Ginzel, contract laying submerged pipe, River Rouge	2,366.60
T. Brady, diver's services	285.00
Machinery and repairs	961.70
Sanitary fountains and fittings	395.00
Packing, hose, rope, rubber, etc	1,873.55
Fixtures, pipe and fittings	1,161.62
Valves, gauges, brass plugs, bushings, etc	956.70
Tools and repairs	2,440.77
Hardware	1,015.16
Lead furnaces and repairs	526.34
Ball joints	300.00
Paints, oils, brushes, glass, etc	551.87
Lanterns and globes	402.53
Howe Scale Co., railroad scale	847.00
Rubber boots	244.57
Heaters and repairs	476.15
Doctor and hospital services	123.00
Howie Roofing Co., roofing	449.87
Printing and stationery	886.24
Car tickets	280.00
Ventilators, dampers and pipe covering	340.29
Oil and gasoline	745.63
Protecting railroad tracks	711.50
Oil and testing tanks	488.00
Electric fixtures and fittings	773.83
Telephone and Gas Co., repairs	688.71
Extending and repairing railroad siding	880.16

Automobiles	3,257.50	
Automobile repairs and supplies	2,553.13	
Miscellaneous	1,248.72	
Total		$720,665.76

Iron Pipe (Horse Expense)—

Feed and bedding	$ 2,539.03	
Shoeing	282.10	
Harness and wagon repairs	72.86	
Drugs and veterinary services	67.04	
Livery care	44.75	
Miscellaneous	80.58	
Total		$ 3,086.36

Pumping Works (Grounds only)—

Pay rolls	$ 10,063.46	
Hardware, nails, pipe, fittings	222.38	
Paint, glass and oils	119.42	
Horse expense	178.40	
Painting stand pipe	130.00	
Sod, seeds, pots	147.86	
Miscellaneous	466.60	
Tile	26.20	
Total		$ 11,354.32

Pumping Works (old) Construction—

Holly Engine Co., on contract	$ 30,000.00	
Miscellaneous	153.80	
Total		$ 30,153.80

New Pumping Station (Construction)—

Pay rolls	$ 47,633.58	
Cement, sand, gravel and stone	18,297.16	
Lumber and brick	4,502.00	
Structural steel, plates, bolts, etc	3,369.40	
Architects' estimate, Smith, Hinchman & Grylls	4,231.59	
Hardware, nails, iron rails, pipe and fittings	643.17	
Tools and repairs	254.71	
Hose, rope and packing	127.72	
Doctor and hospital services	271.00	
Wisconsin Bridge & Iron Co., contract	57,800.00	
Seidler Miner Electric Co., contract	768.16	
F. H. Goodard, Inc	24,835.83	

Freight and switching charges	1,347.01	
Miscellaneous	510.14	
Total		$164,591.46

Engineering—

Pay rolls	$ 19,098.04	
Automobile and motor cycle	1,311.67	
Tracing cloth, paper and supplies	205.63	
Subscription, books and maps	122.30	
Instruments and repairs	286.91	
Printing and stationery	204.65	
Camera supplies	22.86	
Postage stamps and car tickets	140.00	
Telephone rental	73.72	
Civil Engineer, traveling expenses	28.85	
Miscellaneous	249.89	
Total		$ 21,744.52

Meters (Construction)—

Pay rolls	$ 4,691.17	
Meters	19,819.35	
Specials and fittings	638.41	
Freight charges	111.84	
Printing	107.83	
Tools	34.07	
Hardware	16.54	
Bicycle repairs	23.40	
Horseshoeing and harness repairs	60.60	
Oil and gasoline	4.93	
Miscellaneous	43.72	
Total		$ 25,551.86

Interest—

Interest on $20,000.00 loan from Sinking Fund	$ 700.00	
Total		$ 700.00

Office Furniture and Fixtures—

Furniture and fixtures	$ 238.73	
Total		$ 238.73

Plumbers' License—

Printing	$ 7.50	
Total		$ 7.50

Interest—		
Coupons	$ 45,817.50	
Total		$ 45,817.50
Sinking Fund—		
Bonds purchased	$ 65,000.00	
Total		$ 65,000.00
Hurlbut Fund—		
Librarian and assistants	$ 1,594.50	
Superintendent and labors	2,793.83	
Subscriptions	6.00	
Miscellaneous	26.00	
Total		$ 4,420.33
Water Rates—		
Refund	$ 55.83	
Total		$ 55.83

RECAPITULATION OF EXPENDITURES, FOR OPERATION, MAINTENANCE, CONSTRUCTION AND INDEPENDENT.

For Operation and Maintenance—		
Office	$ 37,508.75	
Service connections	21,619.68	
Pumping water	109,402.85	
Repairing leaks	4,092.64	
Meter Repairs and Expense	4,838.59	
Percentage	5,351.67	
Inspection	8,317.36	
Harness and wagon	312.25	
Real estate, revenue and expense	3,573.20	
Pumping works (grounds only)	11,354.32	
Service connections and repairing leaks, horse expense	3,086.37	
Office furniture and fixtures	238.73	
Plumbers' license	7.50	
Total		$209,703.91
For Construction—		
Iron pipe	$720,665 76	
Iron pipe, horse expense	3,086.37	
Meters	25.551.86	
Engineering account	21,744.52	
Pumping works (new)	164,591.46	

Pumping works (old)	30,153.80	
Total		$965,793.76

For Independent—

Interest	$ 45,817.50	
Bonds purchased	65,000.00	
Hurlbut Fund	4,420.33	
Interest, Note Sinking Fund	700.00	
Water rates (refund)	55.83	
Total		$115,993.66

RECAPITULATION OF EXPENDITURES.

Total Operation and Maintenance	$ 209,703.91
Total Construction and Works	965,793.76
Total Independent	115,993.66
Total	$ 1,291,491.33

CASH STATEMENT FOR YEAR ENDING JUNE 30th, 1911.

		DR.	
Cash on hand, June 30th, 1910		$ 4,859.86	
Cash in bank—			
General Fund	$ 18,671.08		
Sinking Fund	39,041.05		
Hurlbut Fund	33.00		
Secretary Fund	1,000.00		
		$ 58,745.13	
Total receipts		$ 1,256,240.23	
			$ 1,319,845.22

		CR.	
Cash on hand, June 30th, 1911		$ 5,011.00	
Cash in bank—			
General Fund	$ 13,763.94		
Outstanding check	39.25		
		$ 13,724.69	
Sinking Fund		8,314.38	
Hurlbut Fund		303.82	
Secretary Fund		1,000.00	
Total disbursements		$ 1,291,491.33	
			$ 1,319,845.22

THE FIRST NATIONAL BANK.

DETROIT, MICH., JULY 1, 1911

Benj. F. Guiney, Secretary, Board of Water Commissioners of the City of Detroit

DEAR SIR:—This is to certify that the amounts of balances in this bank to the credit of the Board of Water Commissioners of the City of Detroit, at the close of business June 30th, 1911, were as follows:

General Fund	$13,763.94
Sinking Fund	8,314.38
Hurlbut Fund	303.82
Secretary Fund	1,000.00

Yours truly,

F. C. BLOMFIELD,
Auditor.

ESTIMATED VALUATION OF WORKS.

Real Estate (estimated valuation)	$ 723,473.43
Buildings, engines, docks, basins, tunnel and crib	3,102,970.36
Water pipes in use	7,292,419.80
Office furniture and fixtures	13,152.45
Meters in use	164,835.04
Tools and Material on hand—	
In office of Civil Engineer	29,152.80
Inspection Department	300.00
In Meter Department	7,796.88
In Pumping Works Department	15,261.60
In Hurlbut Fund Department	1,420.45
At Storage Yard	184,825.59
At Emergency Station	7,711.39
Total	$11,543,319.79

Bonded Indebtedness.

The following table shows the dates of issue and amount of bonds of this department outstanding at this date. The total amount issued by the Board during its existence is $3,215,000.00 of which $300,000.00 were refunded and $1,570,000.00 redeemed, leaving a balance due of $1,345,000.00.

No. of Issue	Act of	Issued	Payable	Amount	Rate of Interest	Redeemed or Refunded	Out-standing
7th	1873	Jan.10, 1895	Jan. 10, 1925	$ 100,000	4"	....	$ 100,000
*ref'nd	1869	Feb. 1, 1900	Feb. 1, 1930	200,000	3½"	$ 20,000	180,000
	1873	Jan. 1, 1903	Jan. 1, 1933	50,000	3½"	....	50,000
	1873	Sept. 1, 1903	Sept. 1, 1933	150,000	3½"	....	150,000
	1901	June 1, 1904	June 1, 1934	200,000	3½"	....	200,000
Refund	1873 1901	Aug. 1, 1904	Aug. 1, 1919	100,000	4"	....	100,000
	1901	Feb. 1, 1905	Feb. 1, 1935	150,000	3½"	....	150,000
**	1901	Aug. 1, 1908	Aug 1, 1938	250,000	3½"	....	250,000
***	1901	July 1, 1909	July 1, 1939	165,000	3½"	......	165,000
				$1,365,000		$ 20,000	$ 1,345,000

** $75,000 in bonds of this issue are held by the Sinking Fund of this Board.
*** $65,000 in bonds of this issue are held by the Sinking Fund of this Board.

Respectfully submitted,

BENJ. F. GUINEY,
Secretary.

REPORT OF THE CIVIL ENGINEER.

DETROIT, MICH., JULY 1ST, 1911.

To the Board of Water Commissioners of the City of Detroit, Michigan.

GENTLEMEN:—Your Civil Engineer hereby respectfully submits a brief report of the work done by and under his direction, for the year ending June 30th, 1911.

CIVIL ENGINEERING DEPARTMENT.

Pressures throughout the city have changed but little. as may be seen by referring to the accompanying table, compiled from readings taken hourly throughout the year. The friction between the pumping station and the consumer has increased nearly a pound in the low service district, and this district includes about 80 per cent. of the city, but this increase has been made up by increasing the pressure at the pumping station from 53.11 to 53.81 pounds. Pressures in the northern portion of the city have been continued with but little change, although the tendency has been upward, owing to an increase of pressure of from 71.75 to 72.48 pounds at the pumping station.

The increase in the consumption over the preceding year for the last four years has been as follows:

1908-9, 3.84%; 1909-10, 12.11%; 1910-11, 8.02%

CONSUMPTION OF WATER IN DETROIT AND VILLAGES.

Corporation	U. S. gallons supplied July 1, 1910, to June 30, 1911, inclusive		Est. No. Persons Supplied	Gallons per capita daily
	Total	Daily Avge.		
Detroit, unmetered	21,623,714,839	59,243,055	501,138	180.4
Detroit, metered	11,387,846,712	31,199,580		
Highland Park, metered	321,871,880	881,841	8,122	108.6
River Rouge, metered	126,717,932	347,172	5,094	68.2
Ecorse, metered	17,725,356	48,563	1,698	28.6
Hamtramck, metered	197,140,636	540,111	5,094	106.3
Totals	33,675,017,355	92,260,322	521,146	177.3

The quantity of unmetered water for Detroit given above includes that used by the village of St. Clair Heights and the townships of Hamtramck and Grosse Pointe; and the quantity of metered water for Detroit includes 1,022,594,540 gallons of free water which is metered.

The general statistics regarding the total consumption are given as follows:

Maximum day, June 23, 1911	127,955,650 gals.
Minimum day, Dec. 3, 1910	69,940,640 gals.
Average daily(Entire System)	92,260,322 gals.
Average Daily (High Service)	20,125,159 gals.
Average Daily (Low Service)	72,135,163 gals.
Total for Year	33,675,017,355 gals.
Maximum Hour (Entire System) June 23, '11, 6 to 7 P. M	6,747,390 gals.
Maximum Hour (High Service) June 23, '11, 6 7 P. M	1,500,000 gals.
Maximum Hour (Low Service) June 23, '11, 6 to 7 P. M	5,247,390 gals.
RATE PER DAY AT MAXIMUM HOUR	161,937,360 gals.
Minimum Hour (Entire System) Nov. 25, '10, 3 to 4 A. M	2,302,960 gals.
Rate per Day at Minimum Hour	55,271,040 gals.

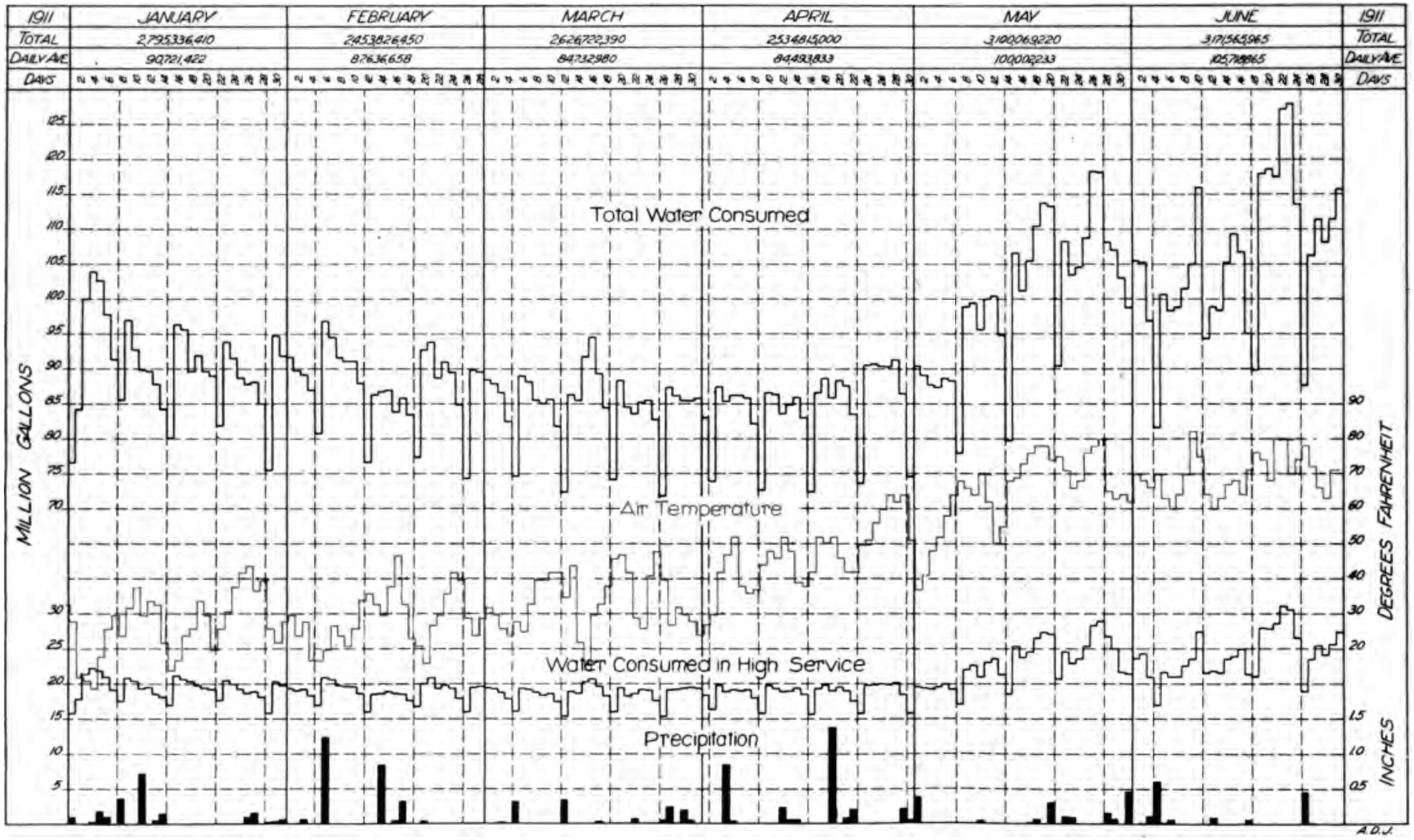
The maximum daily consumption was 139 per cent.; the minimum daily consumption was 76 per cent.; the maximum hourly consumption was 176 per cent.; and the minimum hourly consumption was 60 per cent. of the average in each case.

Attention is especially called to the accompanying map of the City of Detroit, on which are shown the present and some proposed pipes, the lines of equal pressure, equal friction, contours, and locations of gauges from which hourly readings are taken.

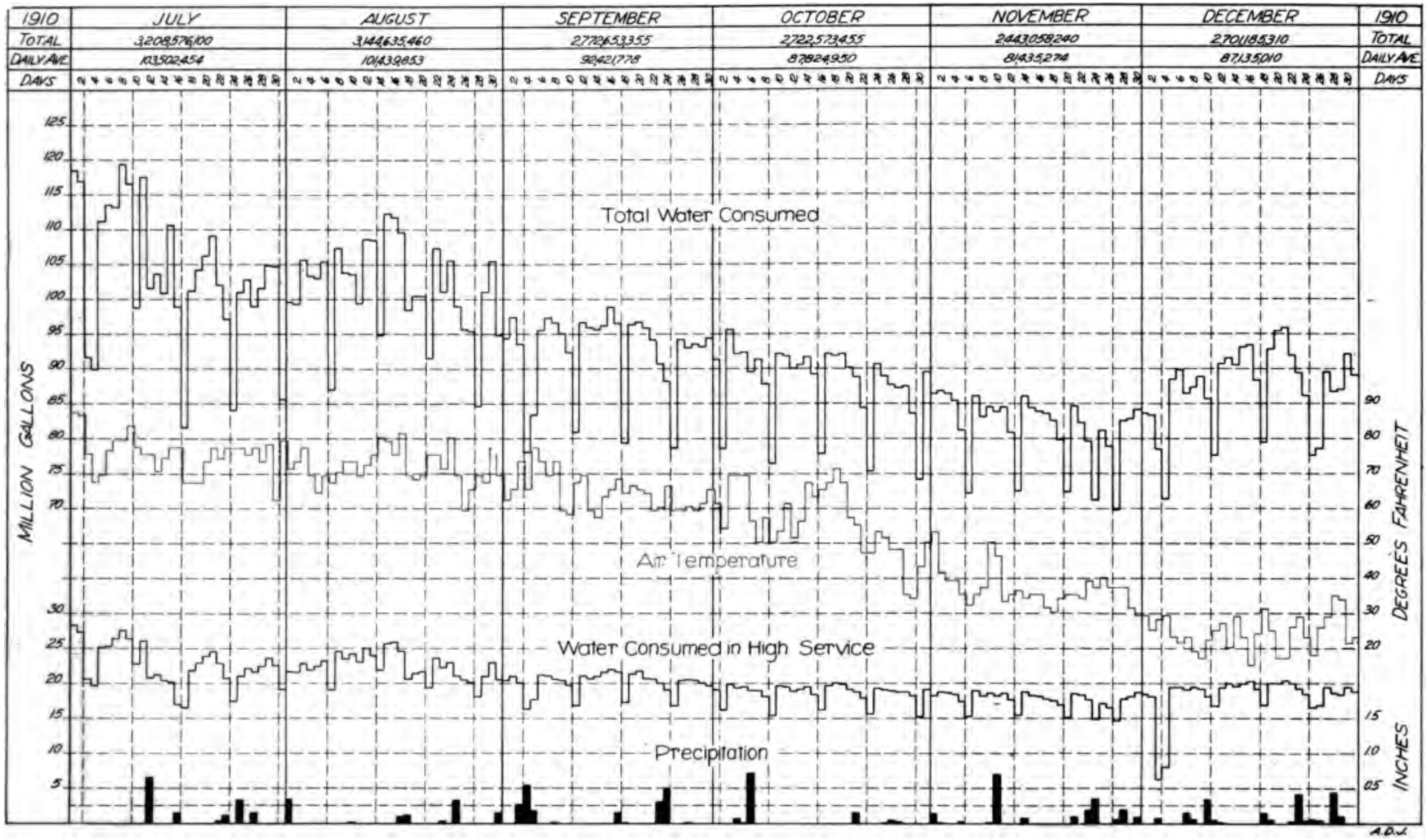
Table of Pressures.

	LOCATION OF GAUGES.	Elevat'n above City datum	Elevat'n above surface pump wells (92 00) at which engine gauges are set	July 1, 1909, to June 30, 1910. Average Daily Consumption 85,411,323 Total Consumption for Year 31,175,155,100				July 1, 1910 to June 30, 1911 Average Daily Consumption 92,260,322 Total Consumption for Year 33,675,017,355				Increase or Decrease Friction during last year		Maximum hour observed June 23, 1911. 6,747,390 Gals 6 to 7 p m. Daily Rate 161,937,360 Gals.		Minimum hour observed Nov. 25, 1910 2,302.960 Gals. 3 to 4 a. m. Daily Rate 55,271,040 Gals.	
				Pressures, Pounds			Fric. Loss Lbs.	Pressures, Pounds.			Fric. Loss, Lbs.	Pounds		Average Pressure Lbs.	Fric. Loss. Lbs.	Average Pressure Lbs.	Fric. Loss Lbs.
		Feet	Pounds	High.	Low.	Mean		High.	Low.	Mean		Inc.	Dec.				
Low Service	Pumping Station	92,000	....	61	45	53.11	....	61	45	53.81	....	....	......	54.38	....	48.00	....
	Engine No 32, Vanda and Jefferson	103.419	4.94	56	38	47.02	1.15	55	35	46 51	2.36	1.21	......	43.00	6.44	45.00	1.94
	Engine No. 26, Crane and Brinket	125.787	14.62	45	29	36.43	2.06	43	30	36.26	2.93	.87	......	34.00	5.76	32 50	.88
	" No. 7, Concord near Jefferson	124.773	14.19	42	30	36.72	2.21	42	30	36 94	2.68	.47	......	35.00	5.19	35.00	1.19
	Engine No. 19, Congress near Jos. Campau	122.473	13.19	44	30	3 .34	3.58	43	25	36.80	3.82	.24	......	34.00	7.19	35.50	.69
	" No. 2, Hastings near Congress	120.981	12 55	36	27	31.82	8.74	40	21	32.43	8 83	.09	......	25.50	16.33	33.00	2.45
	Water Office, Randolph and Jefferson	125.176	11.36	34	20	28.11	10.64	34	18	28 20	11 25	.61	......	20.00	20 02	30 00	3.64
	Engine No. 3, Griswold and Clifford	123.059	13 44	34	22	29.19	10.48	35	21	29 02	11.35	.87	......	27.50	13 44	30.00	4 56
	" No. 8, Sixth and Baker	122 144	13.05	37	20	29.81	10.25	36	19	29 65	11.11	.86	.....	21 50	19.83	33.00	1 95
	" No. 4, Eighteenth near Howard	116.179	10 47	35	21	29.48	13.16	36	17	29.36	13 98	82	......	21.00	22.91	32.00	5.53
	Engine No. 10, Sixteenth and Bagg	125.282	14.41	33	16	26.92	11.78	35	14	26.65	12.75	.97	......	15.00	24.97	30.50	3.09
	" No. 15, Hubbard near Fort	114.617	9.79	38	21	31.71	11.61	38	19	31 35	12.67	1.06	.....	20 50	24.09	34 50	3.71
	" No 29, Solvay and Jefferson W	115.052	9.98	36	20	30 29	12.84	40	16	31 72	12.11	......	.73	22.00	22 40	36 00	2.02
	Truck No. 13, Lewerenz and Fort	115.564	10.20	36	15	29.50	13.41	37	10	28.86	14 75	1.34	......	11.50	32 68	34 00	3.80
	Engine No. 27, Junction and Rogers	113.736	9.41	40	19	31.59	12.20	39	15	30.97	13.43	1.23	......	16.50	28.47	36 00	2.59
	" No. 14, Scotten near Michigan	121.368	12.71	36	18	20.19	11.21	36	13	28.97	12 13	92	......	25.00	16.67	33 90	2.29
	" No. 22, Michigan near Hammond	119.444	11.88	35	13	26.59	14.64	34	12	25 86	16.07	1.43	......	14.50	28.00	32.00	4.12
	Truck No. 10, Sheridan and Mack	140.254	20.89	36	21	28.28	3.94	35	20	28.23	4 69	.75	.....	25 00	8.49	25.00	2.11
	Engine No 18, Mt. Elliott near Sylvester	146.233	23.48	33	21	25.-9	4 14	32	18	25.56	4.77	.63	......	21.00	9.90	24.00	.52
	" No. 11, Grandy and Gratiot	143 211	22 17	36	22	28.51	2.43	36	23	28.45	3 19	.76	......	27.50	4 71	27.50	1.67
	" No. 6, High near Hastings	142 631	21 92	26	16	21.50	9.69	30	12	24 72	7.17	......	2.52	25.00	7.46	25.00	1.08
	Storage Yard, Orleans and Erskine	150 635	25.38	25	13	19.12	8.61	26	12	19.71	8.72	.11	......	12 50	16.50	19 00	3.62
	Truck No. 5, Russell and Erskine	147.742	24.13	25	13	20.53	9.45	27	8	21.28	8 40	......	1.05	15.00	5.25	21.50	2.37
	Engine No. 5, Alexandrine near Cass	148 482	24.45	25	10	19.04	9.62	28	8	18.99	10.37	.75	......	10.00	19.93	20.00	3.55
	" No. 12 Sixteenth and Grand River	141.546	21.45	25	9	19.54	12.12	26	6	19.28	13.08	96	......	8 00	24.93	22.00	4 55
	" 31, Cobb, near West Boulevard	135.115	18.66	29	10	20.70	13.75	28	6	20.35	14.80	1 05	......	8.00	27.72	25.00	4.34
	" No. 20, Baldwin and Gratiot	145.368	23.10	35	20	26.77	3.34	34	16	26.67	4.04	.80	.....	17.00	14.28	25.50	.60
High Service	Pumping Station	92.000	....	100	59	71.75	....	100	58	72 48	....	......	......	87.50	....	63.00	....
	Engine No 18, Mt Elliott near Sylvester	146.233	23.48	56	34	40.97	7 30	57	32	42.33	6.67	...	.63	41.50	22.52	35.00	4 52
	" No. 23, Moran and Boulevard	154.288	26 96	49	25	32 90	11.80	50	28	35 41	10.11	...	1 78	35.00	25 54	31.50	4.54
	" No. 28, Riopelle and Milwaukee	155 556	27.52	45	18	28 30	15 93	38	18	29.34	15.62	......	31	19.50	40.48	28.50	6.98
	" No. 13, Russell and Ferry	157.304	28.27	40	22	28.87	14.61	41	21	30 19	14.02	......	.59	23.00	36.23	29.50	5.23
	" No. 17, Cass and Amsterdam	152 825	26.33	40	17	28.31	17.11	38	10	28.17	17.98	.87	......	12.00	49.17	29 00	7.67
	" No. 21, Lincoln near Piquette	154.880	27.22	41	14	28.75	15 78	38	11	29.09	16 17	.39	......	12.00	48.28	29 50	6.28
	" No. 24, Mott near John R	155.855	27.64	32	10	26.33	17.78	34	8	26.06	18.78	1.00	.....	9.00	50.86	27.50	7.86

DAILY WATER CONSUMPTION, AVERAGE TEMPERATURE AND PRECIPITATION



DAILY WATER CONSUMPTION, AVERAGE TEMPERATURE AND PRECIPITATION



The 48-inch pipe on High street was extended westward a distance of 1,405 feet, to a point midway between St. Antoine and Hastings streets, and was put in service July 26, 1910; and on Dec. 9th, 4,921 feet of 48-inch and 1,095 feet of 42-inch pipe were put in service on Palmer, Sheridan and Forest avenues, north of Sylvester avenue.

Nearly six miles of pipe have been laid during the year for fire protection, as follows:

6-inch	706 ft.	$ 1,255.00
8-inch	9,165 ft.	17,986.78
10-inch	973 ft.	1,636.50
12-inch	15,897 ft.	43,958.55
16-inch	4,738 ft.	17,484.00
Total length and cost	31,479 ft.	$82,320.83

The fire department used 24,210,050 gallons of water at 578 fires. Fire engines worked a total of 73,000 minutes, and took 23,273,695 gallons of water from 847 hydrants in 70,015 minutes and took 936,355 gallons from 35 street reservoirs in 2,985 minutes. The average use of each of the above mentioned hydrants was 82.6 minutes at 332 gallons per minute, and of each of the reservoirs 85 minutes at 314 gallons per minute. There are now 5,596 steamer hydrants and 536 street reservoirs in service, an increase of 258 hydrants and a decrease of 7 reservoirs during the year.

The number of persons per family in Detroit as determined by the U. S. census and the water works counts of families, for the past forty years has decreased as follows:

Year	1870	1880	1890	1900	1910
Persons per Family	5.089	4.995	4.877	4.722	4.599

Your Civil Engineer estimates, in the manner indicated in the annual report for 1904, the number of persons per family to use for estimating the population for each year from 1910 to 1920 to be as follows:

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Year	Persons per Family	Year	Persons per Family
1911	4.586	1916	4.522
1912	4.573	1917	4.509
1913	4.560	1918	4.496
1914	4.547	1919	4.483
1915	4.535	1920	4.470

The total number of families, in the city limits, as determined by the June census of the Board was 108,816, and, assuming 4,586 persons per family, the estimated population is 499,030. This count within the city includes 175 families not supplied with water and does not include 634 families living just outside the limits of the city, but not included in the enumeration of the villages. The estimated number of persons supplied with water in Detroit is 498,230, and as there are 93,166 taps in the city, there are 5.34 persons per tap.

There is now a total of 231 private fire plants and 42 hydraulic elevators in Detroit, an increase of 31 of the former and 4 of the latter during the past year. Regular inspections have been made and the seals on 82 sealed valves have been found broken.

A careful electrolytic survey of the city was made in the spring of this year to determine as far as possible the localities in which trouble from electrolysis might be expected, and to give a definite idea of the extent of the danger that may be expected from this source. An examination of the accompanying map will show that there are several danger zones, the more important of which may be mentioned: (1) a section in the vicinity of Jefferson avenue and Hastings street, (2) that portion of Detroit which formerly comprised Delray, (3) all that portion of Woodward avenue north of the North Boulevard.

Cases of pipe which has been damaged by electrolysis and which have been investigated by this department are as follows: Fire Engine House 19, on Congress street, near Jos. Campau, a five-eighths inch lead connection destroyed; two leaks in the 4-inch pipe in Jefferson avenue West, Detroit, near River Rouge; 400 feet of 6-inch pipe was condemned and abandoned in Dearborn avenue south of Fort street; and leaks in lead service connections as follows: 452 Woodbridge, 381 Jefferson, 934 Grand River, Third and Selden, and 233 Crawford.

On October 14, 1910, the Board contracted with the Holly Manufacturing Company, Buffalo, N. Y., for one vertical triple expansion pumping engine, for $105,769.00, to be erected on foundations furnished by the Board. This engine has been placed in the old station at the east end, and on June 29, 1911, all connections were completed and the pump was ready for operation. This engine has cylinders 32, 60 and 90 inches in diameter, plungers 37.5 inches in diameter, stroke 66 inches, and is of the through flow type, with double A frames and surface condenser. It is capable of pumping against a pressure of 100 pounds per square inch, but will be tested when working against a water pressure of 75 pounds, and with steam at 140 pounds.

The 12-inch submerged pipe line across the Detroit River, from Gladwin Park to Belle Isle was finally tested and accepted August 31, 1910. The portion across the river included in the contract was 2,940.2 feet long, and the total cost of the line was $17,216.09. The submerged line across the River Rouge at Jefferson avenue West, consisted of 281 feet of 16-inch pipe was finally completed and tested June 1, 1911. The 10-inch submerged pipe which crosses the Detroit River at Belle Isle Bridge, and which was laid in 1893, was

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tested and five leaks were repaired at a cost of $880.35, the work being completed Oct. 26, 1910.

Two breaks in mains of a serious nature occurred during the fiscal year. On July 15, 1910, the 42-inch high pressure main in Sylvester avenue broke at a point 100 feet East of the East line of Townsend avenue; and again at 10:30 P. M. on August 10, 1910, the same main burst at a point 11 feet west of the west line of Sheridan avenue. The causes for these breaks could not be determined, but no evidence could be found that they were due to settlement of foundations, defective material or workmanship, or electrolysis.

No trouble with anchor ice was experienced during the past winter at the intake crib, but the capacity of the tunnel has been reached on several occasions.

Storage Yard.

All of the old wooden buildings and platforms have been razed, and the two old wooden double dwellings on Erskine street, near Dequindre, which have been occupied by employees of the Board for many years, were sold and removed. Among the principal items of construction may be mentioned building a two-story brick barn, 34 feet by 77 feet, with 19 single stalls, 2 box stalls, and harness room on the ground floor, and storage for hay and other feed on the second floor; the installation of a central steam heating plant with conduits, pipes and radiators; building wagon sheds, boiler room, wash room for vehicles and two rooms for vehicles; building a two-story brick shop for the meter department 40′ x 75′; building concrete platforms and roadways; installing 100 ton track scales, a new railroad siding, fire protection system, and watchman's electric signal system; and building new fences.

Among various classes of work which are attended to by men from the Storage Yard appear the following: Tapping mains and inserting 4,586 five-eights inch and 1,784 one-inch corporation cocks; setting 150 sleeve and valves, and 30 public sanitary drinking fountains, repairing 110 leaks in mains and attending to 411 leaks in service connections; examining and greasing gates; flushing pipes; loading, unloading and delivering pipe, valves and other materials; and doing a large amount of miscellaneous work. There are employed on this work and for the delivery of material, 3 two-passenger autos, 5 small auto trucks; 2 triple hitch, 9 double hitch, and 24 single hitch horse trucks or wagons; and 24 horses divided into one triple and two double teams and 17 singles. The horses and trucks needed in addition to those owned by the Board are obtained from outside parties.

The cost of work done in the Storage Yard Department may be summarized as follows:

Building wagon sheds, boiler room and extensions	$ 7,029.06
Installing heating plant	4,159.79
Building barn	7,188.05
Building wooden platform	1,120.93
Laying railroad tracks	1,278.12
Building shop for meter department	8,163.18
Building concrete platform	2,252.99
Building concrete roadway, east yard	1,638.92
Installing 100 ton track scales	1,656.22
Handling material, cleaning and trimming pipe	10,023.55
Caring for horses, stables and wagons	4,060.50
Making and repairing tools	2,205.08
Miscellaneous	10,596.39
Total	$60,857.84

CONSTRUCTION DEPARTMENT.

The amount of pipe laid during the past twelve months exceeds by far the quantity ever before laid in Detroit in a like period. In all 42.8 miles of mains were laid, at a cost of $418,009.50 for material, $209,435.11 for labor, or at a total cost of $628,388.61.

A general statement of the magnitude of the distribution system appears as follows:

Size in Inches	Laid During Year Feet	Discontinued During Year Feet	Total in System June 30, '11 Feet	Total in System June 30, '11 Per Cent.	Total Feet Outisde Detroit June 30, '11	No. of Gates in System June 30, '11
2			4.624	.107		
3		2,139	53,497	1.250		20
4	2,248	20,245	810,946	18.966	33,678	1,974
6	63,145	16,515	2,067,680	48.358	277,326	4,203
8	84,128	3,613	573,243	13.406	82.937	1,350
10	4,825		236,881	5.540	8,143	481
12	34,494	104	149,301	3.492	10,040	262
16	18,007		82,186	1.921	931	100
18			87	.002		2
20			393	.009		10
24	1,523		91,371	2.137		72
30			54,635	1.278		39
36			7,948	.186		6
42	2,257		101,989	2.385		61
45			103	.002		
48	15,244		40,915	.957		16
Totals	225,871	42,616	4,275,799	99.995	413,055	8,596
Miles	42.78	8.07	809.8		78.23	

During the year 507 gate valves were set, including 6-48″, 3-42″, 1-30″, 3-24″, and 18-16″; and on June 30, 1911, 5,425 of the gates mentioned in the above table were provided with brick wells.

Among the lines of pipe which have been laid during the year, those of most importance may be listed as follows:

Location	Size	Feet	Cost.
Bewick, Kercheval to Bingham, and West on Bingham West on Bingham to Hurlbut	48-in.	6,460	$ 94,269.64
Beaubien, Woodward to Horton	12-in.	8,855	18,813.49
Dalzelle, 15th to 12th, and in 12th North to Michigan	48-in.	1,679	27,457.41
15th, Marantette to Dalzelle	48-in.	579	11,537.72
Fort, Forman to River Rouge	24-in.	1,207	6,424.15
Hamilton, Edison to City Limits	16-in.	3,416	11,510.89
High, Russell to Hastings	48-in.	1,405	30,242.96
Kercheval, Bewick to Beniteau	16-in.	2,646	9,690.38
Mack, Bewick to Hurlbut	42-in.	305	6,677.23
Monroe, Rivard to St. Antoine	12-in.	1,283	5,733.23
Palmer, Concord to Sheridan, Sheridan, Palmer to Forest, and Forest, Sheridan to Townsend	48-in.	4,921	101,639.33
Sheridan, Forest to Sylvester	42-in.	1,952	
Stanley, Fourth to Commonwealth, and Trumbull N. of Stanley	12-in.	2,848	7,681.18
Sixteenth, North of Baker	48-in.	200	7,480.74
Third, N. of Boulevard to Edison, and Edison, 3rd to Hamilton Boulevard	16-in.	6,868	23,434.81
Woodward to Cass on Atwater, Shelby and Woodbridge	12-in.	1,606	6,549.15

SHOP.

On March 8, 1910, your Civil Engineer was directed to build and equip a shop at the Storage Yard, and this was first occupied January 28, 1911, when the meter foremen, helpers and machinists moved into this new building from their old quarters in the basement of the main office, and your Civil Engineer took general charge of all work relating to installing, removing, repairing and testing meters. This shop is equipped with lathe, drill press, sensitive drill press, emery wheel, drill grinder, and pipe threader, all driven by a 10 H. P. motor; and with three tanks of two, twenty and 400 gallons capacity respectively, for testing meters. The shop is a two-story brick building 75 feet by 40 feet, steam heated, and located at the northwest corner of Orleans and Erskine streets, and in every way perfectly suited for the purposes for which it is used, viz., meter work, auto maintenance and repairs, and light general machine work.

NEW PUMPING STATION.

At the beginning of the past fiscal year the work of excavating for the engine room of the new pumping station was progressing rapidly and the construction of the concrete foundations had been partially completed. All earth, amounting to 52,625 cu. yds., was removed by hand shoveling into wagons and cars, and the excavation for the building and first three engine foundations was completed Dec. 22, 1910. The cost per yard for removing, hauling and dumping earth from Sept. 1, 1909, to July 31, 1910, was 74 cents for labor and 25 cents for teams; and from August 1, to Dec. 10, 1910, when cars were used exclusively, $1.28 for labor. The average cost from Sept. 1, 1909, to Dec. 10, 1910, was $1.03.

Cost of Excavating and Building Foundations, Tunnels and Engine Foundations in New Pumping Station, and Foundation for Engine No. 7 in Old Station.

	Labor	Teams	Cement	Gravel	Lumber Steel and Lead	Equipment and Misc.	Total	Yards	Per Yard
Drains and Sewers	$ 915.45		10.75			105.92	1,032.12		
Office	81.90				165.02	42.55	289.47		
Cement Sheds	236.37				451.76	102.35	790.48		
Carpenter Shop	102.11				74.49	12.00	188.60		
Water Closet	26.35				53.27	5.00	84.62		
Men's Shanties	17.08				20.00		37.08		
Steel Shed	138.10				287.17	33.00	458.27		
Gravel Platforms	88.23				291.96		380.19		
Grading on Grounds	2,198.43						2,198.43		
Extending Gladwin Park Dock	929.50						929.50		
Backfilling	2,907.43						2,907.43		
Excavating	42,548.29	13,257.64			488.09	2,920.53	59,214.55	52,625	1.12
Concreting Walls and Piers..	44,947.04	2,851.45	17,692.15	7,168.47	14,773.99	13,551.55	100,984.65	12,076	8.36
Concreting Gallery Floors...	2,900.12	172.00	713.91	232.20	2,005.40	68.70	6,092.33	430	14.17
Concreting Foundations, Engines 8, 9 and 10..........	5,088.92	791.90	1,833.12	1,444.95	309.00	95.68	9,563.57	1,521	6.28
Concreting Foundations, Engine 7	637.17	52.00	202.92	123.50	40.80	11.42	1,067.81	130	8.21
Tunnel, S. E. corner.........	493.08		87.98	19.44	99.47	102.50	802.47	36	22.30
Tunnel, S. W. corner........	425.21		87.49	37.05	80.27	112.50	742.52	39	19.04
Tunnel, West End	565.86		58.14	22.80	70.26	53.00	770.06	25	30.80
Collecting and Loading Material	556.39						556.39		
	$105,803.03	17,124.99	20,686.46	9,048.41	19,210.95	17,216.70	189,090.54		

In a separate table will be found an itemized statement of the cost of each class of work.

The foundation for each of the engines for the new station is 38 ft. long, 26 ft. 4 in. wide, and 10 ft. deep, with an extension 12 ft. by 26 ft. 4 in. by 3 ft.

Work was started Nov. 18, 1910, on the steel work for the superstructure of the engine room, and was completed Feb. 15, 1911; and on Feb. 23, 1911, the general contractor for this building began the brick and stone work.

METERS.

There are now 9,713 meters in service, an increase of 886 or ten per cent. during the last twelve months.

The number set, removed and in service is as follows:

	⅝″	¾″	1″	1½″	2″	3″	4″	6″	Total
In Service, July 1, '10	4,660	1,656	1,321	469	409	171	106	35	8,827
Placed During Fiscal Year	748	235	165	51	66	21	15	9	1,310
Removed During Fiscal Year	214	96	84	11	10	4	2	3	424
In Service, June 30, '11	5,194	1.795	1,402	509	465	188	119	41	9,713

A general financial statement regarding meters owned by the Board is as follows:

Valuation of Machinery, Material, Tools, Fixtures, etc			$ 3,335.01
Valuation of new and old meters in stock			4,461.87
Total expended for Meters, according to annual reports, to July 1, 1910		$170.403.74	
Expended for Meters, July 1, 1910, to June 30, 1911	$19,819.35		
Received for Meters sold, July 1, 1910, to June 30, 1911	1,721.21		
Net Expenditure for Meters, July 1, 1910, to June 30, 1911	18,098.14		
Cost of new Meters on hand	3,768.59		
Cost of Meters set, July 1, 1910, to June 30, 1911		14,329.55	
Cost of Meters in Service, June 30, 1911			184,733.29
			$192,530.17

Respectfully submitted,
GEORGE H. FENKELL,
Civil Engineer.

SUMMARY OF STATISTICS.

For the Year Ending June 30th, 1911.

In form recommended by the New England Water Works Association.

GENERAL STATISTICS.

Population by U. S. Census, 1910, 465,766.

Date of construction, 1827 to date.

By whom owned, The Board of Water Commissioners of the City of Detroit.

Source of supply, Detroit River, near Lake St. Clair.

Mode of supply (whether gravity or pumping), pumping.

PUMPING STATISTICS.

1. Builders of Pumping Machinery—
   - One 24 million gal., Compound Beam, Detroit Locomotive Works.
   - One 24 million gal., Compound Beam, Riverside Engine Works.
   - One 30 million gal., Compound Beam, Riverside Engine Works.
   - One 24 million gal., Triple Expansion, E. P. Allis & Co.
   - Two 25 million gal., Triple Expansion, Allis-Chalmers Co.
   - One 25 million gal., Triple Expansion, Holly Mfg. Co.

2. Description of Fuel Used—

   Used 42,970,735 lbs. of "Meadowbrook" run of mine bituminous coal, delivered f. o. b. boat at Water Works dock, at $2.55 per gross ton.

6. Yearly pumpage, 14,165,620,950 gals. high service, 19,509,396,405 gals. low service; total, 33,675,017,355 gals., with an allowance of 1% for slip for three compound and one triple expansion engine, and no allowance for slip for three triple expansion engines.

7. Average static head against which pumps work. Direct pressure, no reservoir.

8. Average dynamic head against which pumps work—
   High service, 72.48 lbs., or 167.43 ft.
   Low service, 53.81 lbs., or 124.30 ft.
   Whole system, 61.33 lbs., or 141.67 ft.

9. Gallons pumped per pound of coal, ... 784.

10. $$\text{Duty} = \frac{\text{Gals. pumped (6)} \times 8.34\ \text{(lbs.)} \times 100 \times \text{Dyn. Head (8)}}{\text{Total Fuel Consumed (2)}} = 92,975,447$$

11 and 12. Cost of pumping, figured on pumping station expenses ($108,711.13); per million gallons pumped, $3.23; per million gallons raised one foot (dynamic), $.0228.

FINANCIAL STATISTICS.

Receipts.

Balance brought forward	$ 63,604.99
(a) From ordinary receipts	1,191,240.23
(b) From extraordinary receipts (bonds, etc.)	65,000.00
Total	$ 1,319,845.22

From Water Rates—		
A. Fixture rates	$ 531,701.29	
B. Meter rates	388,002.06	
C. Total from consumers		$ 919,703.35
D. From tax levy		75,000.00
E. From Bond Issue and Loan		65,000.00
F. From other sources		196,536.88
G. Total		$ 1,256,240.23
Balance brought forward		63,604.99
Total		$ 1,319,845.22

EXPENDITURES.

Water Works Maintenance—		
AA. Operation (management and repairs)		$ 209,759.74
BB. Interest on bonds		45,817.50
Interest on loan, sinking fund		700.00
(AA and BB)		$ 256,277.24
CC. Bonds purchased		65,000.00
Water Works Construction—		
DD. Extension of mains	$ 717,425.81	
EE. Extension of meters	25,551.86	
FF. Special (Pumping Works)	194,745.26	
		937,722.93
GG. Unclassified expenses (real estate)		28,070.83
HH. Miscellaneous (Hurlbut Fund)		4,420.33
Total		$ 1,291,491.33
II. Balance		28,353.89
JJ. Total		$ 1,319,845.22
K. Net cost of works to date		$11,115,801.98
L. Bonded debt at date		1,345,000.00
M. Value of sinking fund at date, including bonds, etc.		168,314.38
N. Average rate of interest		3½% +

STATISTICS OF CONSUMPTION OF WATER.

1.	Estimated population, City of Detroit	499,030
2.	Estimated population on lines of pipe	523,000
3.	Estimated population supplied	521,146
4.	Total consumption for the year	33,675,017,355 gallons
5.	Passed through meters	12,015,302,516 gallons.
6.	Percentage of consumption metered	35.7%
7.	Average daily consumption	92,260,322 gallons
8.	Gallons per day to each consumer	177.3
9.	Gallons per day to each inhabitant, City of Detroit	180.4
10.	Gallons per day to each tap	947.8
11.	Cost of supplying water, per million gallons, figured on total maintenance	$6.12
12.	Cost of supplying water, per million gallons, figured on total maintenance, plus interest on bonds	$7.50

STATISTICS RELATING TO DISTRIBUTION SYSTEM.

MAINS.

1. Kind of pipe, cast iron.
2. Sizes, from 2-inch to 48-inch.
3. Extended 225,871 feet during the year.
4. Discontinued 42,616 feet.
5. Total now in use, 809.8 miles.
6. Cost of repairs per mile, $2.68.
7. Number of leaks per mile, .136.
8. Length of pipe less than 4 inches in diameter, 11.0 miles.
9. Number of hydrants (public) added during year, 258.
10. Number of hydrants (public) now in use, 5,596; cisterns, 536.
11. Number of stop gates added during year, 507.
12. Number of stop gates now in use, 8,596.
13. Number of blow-offs, 953.
14. Number of stop gates smaller than 4-inch, 20.
15. Range of pressure on mains, 6 lbs. to 100 lbs., (Extremes from hourly readings at pressure gauges.)

SERVICES.

16. Kind of pipe, mostly lead and cast iron, some galvanized iron.
17. Sizes, ⅝-inch to 12-inch.
21. Number of service taps added during year, 6,322.
22. Number now in use, 97,341.
25. Number of meters added, 886.
26. Number now in use, 9713.
27. Percentage of services metered, 10.0.
28. Percentage of receipts from metered water, 42.2%.
29. Number of motors and elevators added, 6 elevators. No record of
30. Number now in use, 42 elevators.

BENJ. F. GUINEY,
Secretary.

GEORGE H. FENKELL,
Civil Engineer.

REPORT OF CHIEF ENGINEER.

DETROIT, MICH., July 1, 1911.

To the Board of Water Commissioners

GENTLEMEN:—I have the honor to submit the Engineer's report for the year ending June 30, 1911.

The cost of fuel per million gallons pumped was $1.60, and per million gallons pumped 100 ft. high was $1.14. The amount of water pumped during the year was 33,675,017.355 gallons, making the daily average 92,260,321, which is an increase of 7.4 per cent. compared with the preceding year.

The total expense during the year for pumping water including maintenance, heating station, library and greenhouse, hoisting coal, etc., was $108,711.13, thus making the cost per million pumped $3.23.

The station duty of coal consumed for all purposes for the year was 92,975,447 foot pounds.

Respectfully submitted,

HARRY W. GOULD,
Chief Engineer Pumping Station.

Roll of Commissioners and Their Tenure of Office.

James A. Van Dyke	1853	1855	Died.
Edmund A. Brush	1853	1868	Resigned.
Henry Ledyard	1853	1859	Resigned.
Shubuel Conant	1853	1859	May 1st.
William R. Noyes	1853	1865	Resigned.
Alexander D. Frazer	1855	1871	May 1st.
Julius D. Morton	1859	1865	Died.
John V. Ruehle	1859	1861	Resigned.
Chauncy Hurlbut	1861—1863	1868—1885	Died.
Stanley G. Wight	1863	1868	May 1st.
Jacob S. Farrand	1865	1890	May 1st.
John Owen	1865	1879	May 1st.
Caleb Van Husan	1868	1872	May 1st.
Samuel F. Hodge	1871	1879	Resigned.
Elija Smith	1872	1877	May 1st.
Michael Martz	1877	1887	May 1st.
James Beatty	1879	1885	Died.
John Pridgeon	1879—1884	1886—1891	May 1st.
Marshall H. Godfrey	1884	1889	Resigned.
Edwin F. Conley	1885	1886	May 1st.
Samuel G. Caskey	1885	1895	May 1st.
Joseph Nagel	1887	1890	Died.
August Goebel	1889—1894	1897—1898	Resigned.
Henry M. Duffield	1890	1895	May 1st.
Joseph L. Hudson	1890	1894	May 1st.
Frank E. Kirby	1891	1896	May 1st.
Albert L. Stephens	1894	1897	May 1st.
D. W. H. Moreland	1894	1896	Resigned.
Clarence A. Black	1894	1894	Resigned.
Edward W. Pendleton	1894	1909	May 1st.
Darius D. Thorp	1895	1905	May 1st.
John P. Huckestein	1896	1897	Resigned.
John W. McGrath	1896	1901	May 1st.
Joseph J. Noeker	1898	1902	May 1st.
James W. Millen	1897	1898	May 1st.
James Meathe	1898	1899	Died.
Benjamin Guiney	1899	1900	Resigned.
John Zynda	1900	1908	May 1st.
Joseph J. Crowley	1901	1906	May 1st.
John Schroeder	1902	1907	May 1st.
John F. Dodge	1905	1910	May 1st.
Frederick J. Clippert	1906	1911	May 1st.

MEMBERS OF THE BOARD 1910-1911.

James H. Pound
James Wilkie
Basil A. Lemke
John Gillespie
George Lane

The SIXTIETH ANNUAL REPORT of the Board of Water Commissioners of the City of Detroit

For the Year Ending
June 30th, 1912

President BASIL A. LEMKE.

SIXTIETH ANNUAL REPORT

OF THE

[illegible]

Board of Water Commissioners

OF THE CITY OF DETROIT

TO THE

Common Council of the City of Detroit

TOGETHER WITH THE

Reports of the Officers of the Board

For Year Ending June 30th, 1912

THOS. SMITH PRESS
DETROIT

CONTENTS

Page

Report of the Commissioners 9
Financial Report of the Secretary 15
Report of the Civil Engineer 27
Summary of Statistics 47
Report of the Chief Engineer at Pumping Works 53
Roll of Commissioners 54

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BOARD OF WATER COMMISSIONERS
OF THE
CITY OF DETROIT

MEMBERS:

BASIL A. LEMKE, 1913 JAMES WILKIE, 1914
JOHN GILLESPIE, 1915 GEORGE LANE, 1916
JAMES J. BRADY, 1917

COMMITTEES:

WAYS AND MEANS	Commissioners WILKIE and GILLESPIE
EXTENSION AND CONSTRUCTION	Commissioners GILLESPIE and LANE
PUMPING STATION	Commissioners LANE and BRADY
SUPPLIES	Commissioners BRADY and WILKIE

The President is ex-officio member of each Committee.

OFFICERS:

PRESIDENT	BASIL A. LEMKE
VICE PRESIDENT	JAMES WILKIE
SECRETARY	H. A GILMARTIN
CIVIL ENGINEER	GEORGE H. FENKEL
PURCHASING AGENT AND PAYMASTER	HARRY S. STARKEY
CHIEF ENGINEER AT PUMPING WORKS	HARRY W. GOULD
BOOKKEEPER	GEORGE BARRIE
AUDITOR	J. W. LOEFFLER
CASHIER	D. C. GROBBEL
ASS'T CASHIER	CHARLES W. KEENA
METER CLERK	CHAS. F. GILMER
PERMIT CLERK	LOUIS J. MONTGOMERY

THE BOARD OF WATER COMMISSIONERS

OF THE

CITY OF DETROIT

Rates Adopted June 15th, 1909

FROM JULY 1ST, 1909.

Payable Quarterly

	Quarterly
First 30,000 gallons	**$1 75**
All in excess of 30,000 gallons	**3 cts. per M.**
Minimum rate	**1 75**

ASSESSMENT RATES

	Per Annum
For Family, household purposes, each family	**$3 20**
Stores and Offices, from	**$1 00 to 12 00**
Boarding Houses, in addition to family rate, each boarder or roomer	**40**
Estimated quantities of water, each 1,000 gallons	**07**
Building Purposes, each 1 . brick	**03**
" " each 100 yards plastering	**05**
" " each perch stone	**01**
" " minimum	**50**
Automobiles, each	**1 20**

FIXTURES.

Bath Tub, for families, each	**1 00**
" public, each tub	**4 00**
Automatic Water Closets, for family, 1st closet	**1 60**
" " " each, additional	**60**
Rod Water Closets, not less than	**6 00**
Urinals, not less than	**2 00**
Wash Hand Basin, for family, each	**50**
" " " for other purposes, each person	**15**
Hose Bibb or connection, Premises 30 feet front or less	**1 00**
" " " " 30 feet to 60 feet	**1 40**
" " " " 60 feet to 100 feet	**2 00**
Special rates for larger grounds.	
Fountains	**$10 00 to 20 00**
Street Sprinklers, each wagon	**50 00**

Where there is a waste of water an increase of rates will be made.

ANNUAL REPORT
OF THE
BOARD OF WATER COMMISSIONERS
OF THE
CITY OF DETROIT

JULY 1, 1911 TO JUNE 30, 1912

TO THE HONORABLE

The Common Council of the City of Detroit.

GENTLEMEN:—The Board of Water Commissioners of the City of Detroit, respectfully submits its annual report, for the fiscal year ending June 30, 1912.

Believing as it does that a full understanding of the financial conditions and requirements of this Board is of prime importance at this time, the following facts are presented. The total income of the Board was $1,373,362.53, of which $1,238,362.53 was derived from ordinary receipts, and $135,000.00 was realized from bonds and loans. The total expenditures were $1,364,238.37, of which $996,990.14. was for construction, $234,518.96 for maintainance, ~~$1,373,362.53~~ 4310 for interest on bonds, and $83,000.00 for purchase of bonds and payment of loans. During the year the income from water consumers increased ten and one-third per cent. From carefully prepared estimates it has been found that if the growth of the water works is to keep pace with the expansion of Detroit, four million dollars must be expended for construction during the next three years, in addition to the amount which can be taken for new work from the ordinary receipts.

Realizing as it does that the low water pressures and the breaks in mains during the past year are but symptoms of the over-worked condition of the intake, pumps and pipes, this Board proposes to do everything it can to secure the legislation necessary to provide adequate funds.

The past year has been an exceptional one in the history of the operation of this Board;—first, because of the extremely hot summer and exceptionally cold winter; second, because of the great increase in population of the city of Detroit. These conditions combined brought about a greatly increased consumption of water during the mid-summer and mid-winter months, and in the endeavor to satisfy this demand and maintain reasonable pressures, all pumps, mains, and other apparatus were worked beyond their normal capacity.

According to the records of the Board the population of Detroit increased 40,698, or 8.2 per cent, and the amount of water pumped increased nearly 15 per cent. It further appears that while the average daily consumption for each person supplied was 177 gallons during the preceding fiscal year, it was 187 gallons during the year just past. These quantities, which are averages for the year, have little bearing, however, in determining the necessary capacity of the various parts of the plant, for as this is a direct pressure system, it is necessary to provide conduits, pumps and pipes of sufficient capacity to supply water for all purposes during those times of maximum consumption. Thus, while the average pumpage amounted to 106 million gallons per day, the pumpage for one hour on February 12, 1912, was at the rate of 168 million gallons per day.

As the present intake tunnel has a capacity of from 145 to 175 million gallons per day, depending on the stage of water in the Detroit River, and as the pumpage has already exceeded a rate of 168 millions, it is obvious that work on another tunnel must be begun in the immediate future. To undertake this work it will be necessary to acquire additional land East of Gladwin Park, between the Detroit River and the tract formerly known as the Edwards property, on which the engine room of the new pumping station is now being constructed. This land the Board proposes to acquire if possible by condemnation proceedings as provided by law.

On July 5th, 1911, the new 25 million gallon pumping engine at the east end of the present pumping station was put in service, thereby increasing the pumpage capacity to 177 million gallons per day. There are now a total of seven engines, and of these it has been necessary to operate six a considerable portion of the time. Contracts have been awarded for a brick extension to the present boiler house, with an additional chimney and four 400 horse-power boilers, and it is intended that this work shall be completed during the coming year. It is the further purpose of this Board, as soon as the land can be acquired and the necessary funds provided, to proceed with the erection of a new boiler house in connection with the engine house now under construction.

In all, 35 miles of cast-iron mains have been laid, in sizes from six inches to 48 inches in diameter, at a total cost of $509,029.78. Of this, six miles were laid for better fire protection, at a cost of $69,361.69. Because of lack of funds the Board have been unable to lay large force mains to the extent the growth of the city demands, but such work has been carried on to completion as rapidly as circumstances have permitted. The work of the construction of new force mains during the coming year will be limited only by the amount of money that can be made available for the purchase of material and the payment of labor.

Between January 31 and March 20 there were six breaks in mains twenty-four inches or larger in diameter. Of these, one lowered pressures to one-half normal on the low service, and four caused an entire lack of pressure throughout a portion of the city. In no case was the supply of the entire city affected, nor was there in any case a serious loss of property. Engineers employed by the Board have carefully investigated the conditions which obtained at the time of these breaks and have reported that in their opinion the trouble was due to lack of mains.

Experience has shown that large quantities of water are wasted in Detroit by gross carelessness through leaking fixtures. Further, that water is allowed to run beyond all reason during the spring and summer months for cooling and sprinkling, and in the winter to prevent freezing. As it costs in Detroit about $80,000 for intakes, pipes, pumps and other equipment to gain one million gallons daily capacity of the plant, it can be seen readily that, leaving aside all consideration of the cost of operation and maintenance, all waste beyond what may be considered legitimate, is an extravagance of no inconsiderable magnitude. Realizing this, the Board is gradually extending the use of meters, to include all commercial and manufacturing property, and those residences where waste is allowed to continue.

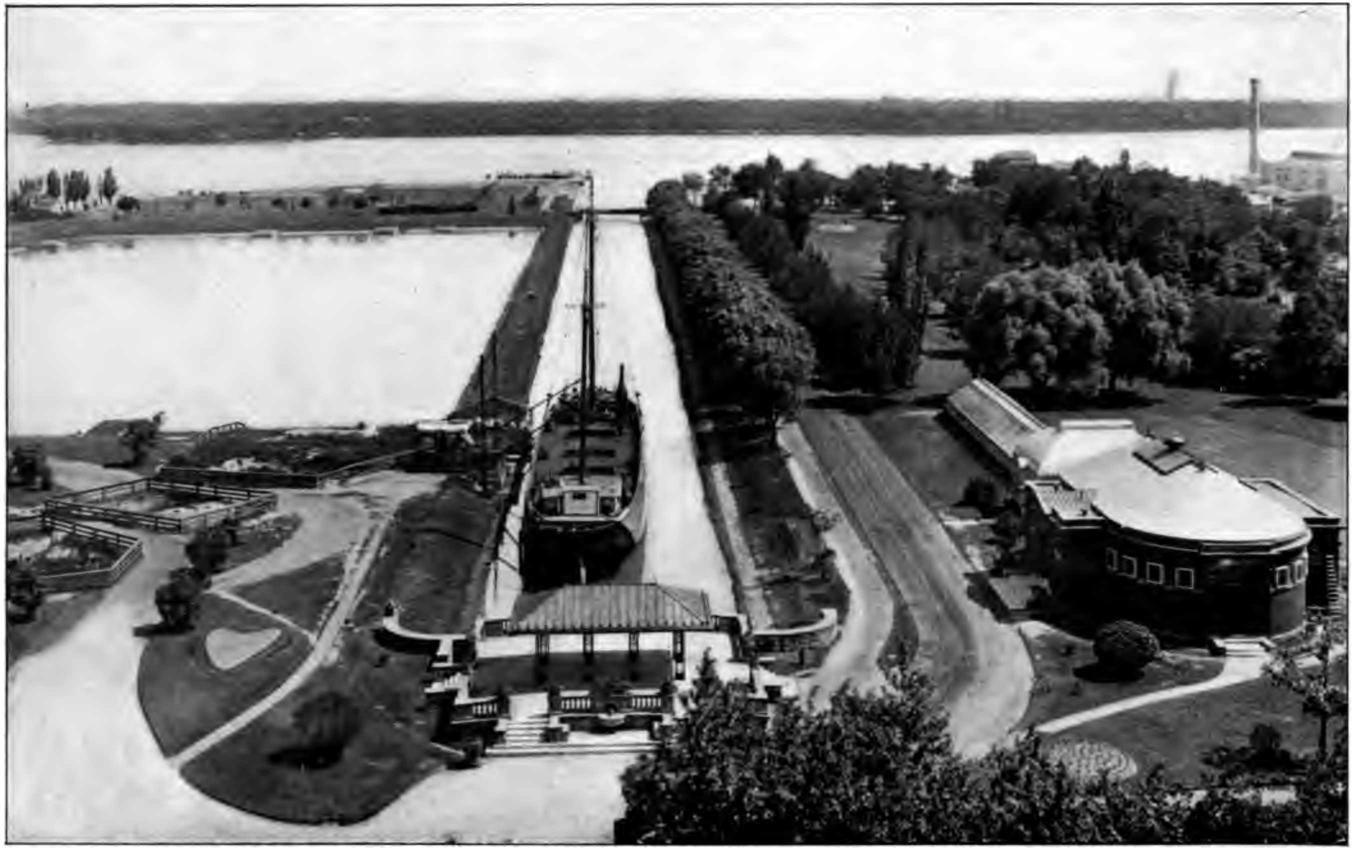
Construction work at the storage yard has included the building of a considerable amount of cement roads. Twelve additional sanitary, continuous flow, drinking fountains have been set in the streets of Detroit.

This Board wishes to again call attention to its belief in the purity of the water supply. Nor is it unmindful of the possibility of pollution, nor the probability that the time may come when a purification plant will become a necessity. At the present time, however, it is believed that the water is wholesome, and that the general healthfulness of the city is in no small degree due to the quality of the water which is furnished her citizens.

Owing to the increasing number of accounts the necessity has become imperative for installing an up-to-date system for the collection of water rates and the handling of the detail work of the office, and this work will be pushed during the coming year.

For a detailed report of the operation of the plant during the year, your Honorable Body is respectfully referred to the detailed reports of its officers which appear on the following pages.

BASIL A. LEMKE,
JAMES WILKIE,
JOHN GILLESPIE,
GEORGE LANE,
JAMES J. BRADY,
Commissioners.



Looking toward Belle Isle from Water Works Tower in Gladwin Park.

REPORT OF THE SECRETARY.

To the Honorable the Board of Water Commissioners of the City of Detroit.

GENTLEMEN:—I respectfully submit the report of the Secretary's office for the year ending June 29, 1912.

The total receipts for the year were One Million, Three Hundred Seventy-Three Thousand, Three Hundred Sixty-Two and 53-100, Dollars, ($1,373,362.53) an increase of One Hundred and Seventeen Thousand, One Hundred Twenty-Two and 30-100 Dollars, ($117,122.30) over the previous year, included in this amount is the sum of Sixty-Seven Thousand, Three Hundred Eighty-One and 4-100 Dollars, ($67,381.04) received from outlying villages and other parties for water main extensions beyond the City Limits.

For construction work in connection with the New Pumping Station there was paid Two Hundred Seventy-Nine Thousand, Nine Hundred Ninety-Four and 17-100 Dollars, ($279,994.17) and an additional sum of Forty-Four Thousand, Eight Hundred Eighty Dollars, ($44,880.00) paid on the new Holly engine, installed in the Old Pumping Station.

One Hundred Seventy-Three Thousand Dollars, ($173,000.00), bonds held by the Sinking Fund, were ordered canceled by the Board, reducing the bonded indebtedness to One Million, Two Hundred and Seven Thousand Dollars, ($1,207,000.00).

RECEIPTS.

Water rates assessed	$585,364.41	
Water rates metered	429,116.87	
Hydrant rental	333.33	
		$ 1,014,814.52

Percentage	11,711.46
Shutting-off and letting-on	1,994.21
Service cocks, permits	21,253.84
Service cocks, labor and material	602.37
Service extensions	110.88
Plumber's license	818.75
City of Detroit	71,753.20
Real estate, revenue and expense	1,462.50
Meter, labor and material	2,153.09
Meter repair and expense, labor and material	56.55
Pumping works	69.00
Repairing leaks	56.88
Horse, wagon and harness account	100.00
Bonuses	3,807.39
Iron pipe, material and labor	31,994.12
Village of River Rouge	3,072.00
Village of St. Clair Heights	6,763.00
Village of Hamtramck	1,774.04
Village of Highland Park	39,999.00
Village of Grosse Pointe Park	1,055.00
Union Trust Co	248.00
Motor Foundry Co	319.00
C. B. Steinheiser	248.00
S. M. Girardin	536.00
Grosse Pointe Tp	100.00
Wallace Bros.	1,193.00
Holden & Murray	4,817.00
John Curry	273.00
Sterling Realty Co.	675.00
Dow & Gilbert	310.00
Henry H. Stender	5,999.00
Office	1.00
Pumping Water Account	132.85
Horse Expense	37.00
Loan Account	70,000.00
Sinking Fund Loan Account	15,000.00
Bonded Indebtedness Account	35,000.00
Hurlbut Fund	4,654.28
Interest on General Fund	2,047.93
Interest on Sinking Fund	1,327.82
Interest on Hurlbut Fund	21.85
Sinking Fund Cash Loan Account	15,000.00
Total	$1,373,362.53

DISBURSEMENTS

Office (Operation)—		
Pay rolls	$ 33,280.54	
Books, stationery and printing	2,188.78	
Advertising and subscription	120.77	
Postage	1,638.00	
Telephone rental	277.74	
Surety Bonds	192.75	
Miscellaneous	1,036.29	
Total		$ 38,734.87
Inspection (Operation)—		
Pay rolls	8,454.92	
Car tickets	560.00	
Miscellaneous	381.31	
Total		$ 9,396.23
Service Connections (Operation)—		
Pay rolls	$ 12,185.50	
Service Cocks, Sleeves and Valves, Pipe and Fittings	7,791.22	
Miscellaneous	564.70	
Total		$ 20,541.92
Pumping Water (Operation)—		
Pay rolls	$ 49,193.92	
Coal	43,435.69	
Unloading Coal	3,607.74	
Boiler and engine supplies and repairs	3,488.27	
Oil and Waste	2,158.81	
Tools and repairs	222.48	
Miscellaneous	1,650.58	
Total		$103,757.49
Horses, Wagons and Harness (Operation)—		
Wagon and harness repairs	$ 1,006.81	
Total		$ 1,006.81
Real Estate, Revenue and Expense (Operation)—		
Insurance premiums	$ 263.34	
Painting library and engineer's house	342.10	
Painting main office building (exterior)	229.00	
Repairs to main office building	152.09	
Miscellaneous	547.53	
Total		$ 1,534.06

Repairing Leaks (Operation)—		
Material and labor	$ 14,892.88	
Total		$ 14,892.88
Sinking Fund—		
Bonds purchased	$ 33,000.00	
Loan	15,000.00	
Total		$ 48,000.00
General Fund—		
Loan, First National Bank	$ 20,000.00	
Loan, Sinking Fund	15,000.00	
Total		$ 35,000.00
Hurlbut Fund—		
Pay rolls	$ 4,428.16	
Miscellaneous	52.15	
Total		$ 4,480.31
Interest—		
Coupons	$ 43,455.00	
Total		$ 43,455.00
Interest, General Fund—		
Interest on $20,000 loan from Sinking Fund	$ 700.00	
Interest on $15,000 demand note from Sinking Fund	88.75	
Interest on 30 day note, First Nat'l Bank	66.67	
Total		$ 855.42
Iron Pipe (Construction)—		
Pay rolls	$252,533.21	
Iron Pipe	252,274.95	
Special castings	23,600.78	
Gates, valves and hydrants	37,688.65	
Lead, lead pipe and solder	11,838.10	
Sand, brick, cement and stone	8,779.01	
Lumber and hardware	5,473.36	
Coal	1,824.67	
Tools and repairs	1,479.60	
Lantern and globes	139.60	
Iron beams and rails	1,336.08	
Car tickets	240.00	
Telephone rental	216.50	
Books, stationery and printing	532.48	

Hose and couplings	93.85	
Inspection and repaving	13,771.64	
Rubber boots and repairs	291.31	
Packing, waste and rope	1,368.63	
Freight and express charges	861.64	
Medical and hospital service	60.00	
Protecting railroad track	419.01	
Drinking fountains and fittings	134.76	
Refunds	2,778.07	
Automobiles and motorcycle	2,557.80	
Automobile supplies	7,086.26	
Team hire	12,583.52	
Venturi meter	1,350.00	
Pulsometer steam pump	675.43	
Geo. Lockerbie, contractor for submerged pipe under River Rouge	1,754.70	
Miscellaneous	2,561.91	
Total		$646,291.76
Iron Pipe (Construction)—		
Horse expense	$ 4,428.54	
Total		$ 4,428.54
New Pumping Station (Construction)—		
F. H. Goddard, Inc., on contract	$169,665.02	
Chapman Valve Co., on contract	10,500.00	
Bethlehem Steel Co., on contract	85,000.00	
Wisconsin Bridge & Iron Co., on contract	2,000.00	
Smith, Hinchman & Grylls, architects est.	6,719.46	
Northern Engineering Works, contract	2,500.00	
Harrigan & Reed, plumbing contract	1,217.00	
Dodson Larsen, contract	1,200.00	
Seidler-Miner Electric Co., contract	425.00	
Miscellaneous	767.69	
Total		$279,994.17
Pumping Station, Old (Construction)—		
Holly Mfg. Co., on engine contract	$ 44,880.00	
Anderson & Taylor, mach. engineers, making test on new engine	240.00	
American Blower Co., A. D. C. Engine	331.00	
Miscellaneous	326.38	
Total		$ 45,777.38

Meters (Construction)—		
Pay rolls	$ 3,447.03	
Meters	20,566.37	
Special castings and fittings	102.61	
Miscellaneous	249.07	
Total		$ 24,365.08
Engineering—		
Pay roll	$ 20,622.63	
Printing, stationery and supplies	527.46	
Instruments and tools	110.40	
Street Car Tickets	160.00	
Miscellaneous	424.82	
Total		$ 21,845.31
Office Furniture and Fixtures—		
Addressograph and supplies	$ 455.09	
Lockers	121,60	
Envelope sealer	35.00	
Watchman detector	150.20	
Miscellaneous	85.65	
Total		$ 938.54
Gladwin Park (Operation)—		
Pay rolls	$ 6,476.35	
Tools and Equipment	58.15	
Horse expense	58.60	
Sod, seeds, pots	169.04	
Repairs	61.79	
Miscellaneous	624.42	
Total		$ 7,448.35
Meter Repairs and Expense (Operation)—		
Pay rolls	$ 4,910.52	
Fittings	2,082.65	
Miscellaneous	72.55	
Total		$ 7,065.72
Service Connections and Repair Leaks (Operation)—		
Horse expense	$ 4,428.53	
Total		$ 4,428.53

RECAPITULATION OF EXPENDITURES FOR OPERATION, MAINTENANCE, CONSTRUCTION AND INDEPENDENT.

For Operation and Maintenance—		
Office	$ 38,734.87	
Inspection	9,396.23	
Service connection	20,541.92	
Pumping water	103,757.49	
Gladwin Park	7,448.35	
Meter repair and expense	7,065.72	
Service connections and repairing leaks, horse expense	4,428.53	
Iron pipe account	17,062.79	
Horses, wagons and harness account	1,006.81	
Real estate, revenue and expense	1,534.06	
Repairing leaks	14,892.88	
Total		$ 225,869.65
For Construction—		
Iron pipe	$ 629,228.97	
Iron pipe, horse expense	4,428.54	
Pumping station (new addition)	279,994.17	
Pumping station (old)	45,777.38	
Meters	24,365.08	
Engineering account	21,845.31	
Total		$1,005,639.45
For Independent—		
Bonds purchased and loan	$ 48,000.00	
Loan, General Fund	35,000.00	
Interest	43,455.00	
Interest, General Fund	855.42	
Office furniture and fixtures	938.54	
Hurlbut Fund	4,480.31	
Total		$ 132,729.27

RECAPITULATION OF EXPENDITURES.

Total Operation and Maintenance	$ 225,869.65	
Total Construction and Works	1,005,639.45	
Total Independent	132,729.27	
Total		$1,364,238.37

CASH STATEMENT FOR YEAR ENDING JUNE 30, 1912.

		DR.	
Cash on hand, July 1, 1911		$ 5,011.00	
Cash in bank—			
General Fund	$ 13,724.69		
Sinking Fund	8,314.38		
Hurlbut Fund	303.82		
Secretary Fund	1,000.00		
		$ 23,342.89	
Total receipts		$1,373,362.53	
			$1,401,716.42

		CR.	
Cash on hand, June 29, 1912		$ 6,334.70	
Cash in bank—			
General Fund	$ 25,219.96		
Less Outstanding checks..	516.65		
		$ 24,703.31	
Sinking Fund		4,940.40	
Hurlbut Fund		499.64	
Secretary Fund	$ 1,003.73		
Less Outstanding checks..	3.73		
		1,000.00	
		$ 31,143.35	
Total Disbursements		$1,364,238.37	
			$1,401,716.42

THE FIRST NATIONAL BANK.
Detroit, Mich., July 3, 1912.

H. A. GILMARTIN, Secretary,
Board of Water Commissioners
Of the City of Detroit.

DEAR SIR:—This is to certify that the amounts of balances on the books of this bank to the credit of the Board of Water Commissioners of the City of Detroit, at the close of business June 29, 1912, were as follows:—

General Fund	$25,219.96
Sinking Fund	4,940.40
Hurlbut Fund	499.64
Secretary Fund,	1,003.73

Yours very truly,

(Signed) IRVING H. BAKER,
Auditor.

FINANCIAL STATISTICS.

Receipts.

Balance brought forward		$ 28,353.89
(a) From ordinary receipts		1,238,362.53
(b) From extraordinary receipts, (bonds, etc.)		135,000.00
Total		$ 1,401,716.42
From Water Rates—		
A. Fixture rates	$585,359.41	
B. Meter rates	429,116.78	
		1,014,476.19
C. From tax levy		71,753.20
D. From bond issue and loan		135,000.00
E. From other sources		152,133.14
F. Total		$ 1,373,362.53
Balance brought forward		28,353.89
Total		$ 1,401,716.42

EXPENDITURES.

Water Works Maintenance—	
AA. Operation (management and repairs)	$ 225,869.65
BB. Interest on bonds	43,455.00
Interest on loan	855.42
(AA and BB)	
CC. Bonds purchased and loans paid	$ 83,000.00
Water Works Construction—	
DD. Extension of mains	$ 655,502.82
EE. Extension of meters	24,365.08
FF. Special (Pumping Works)	325,771.55
GG. Unclassified expenses	938.54
HH. Miscellaneous (Hurlbut Fund)	4,480.31
II. Balance	37,478.05
JJ. Total	$ 1,401,716.42
K. Net cost of works to date	$11,559,262.00
L. Bonded debt to date	1,207,000.00
M. Value of Sinking Fund at date	24,940.40
N. Average rate of interest	3½% plus

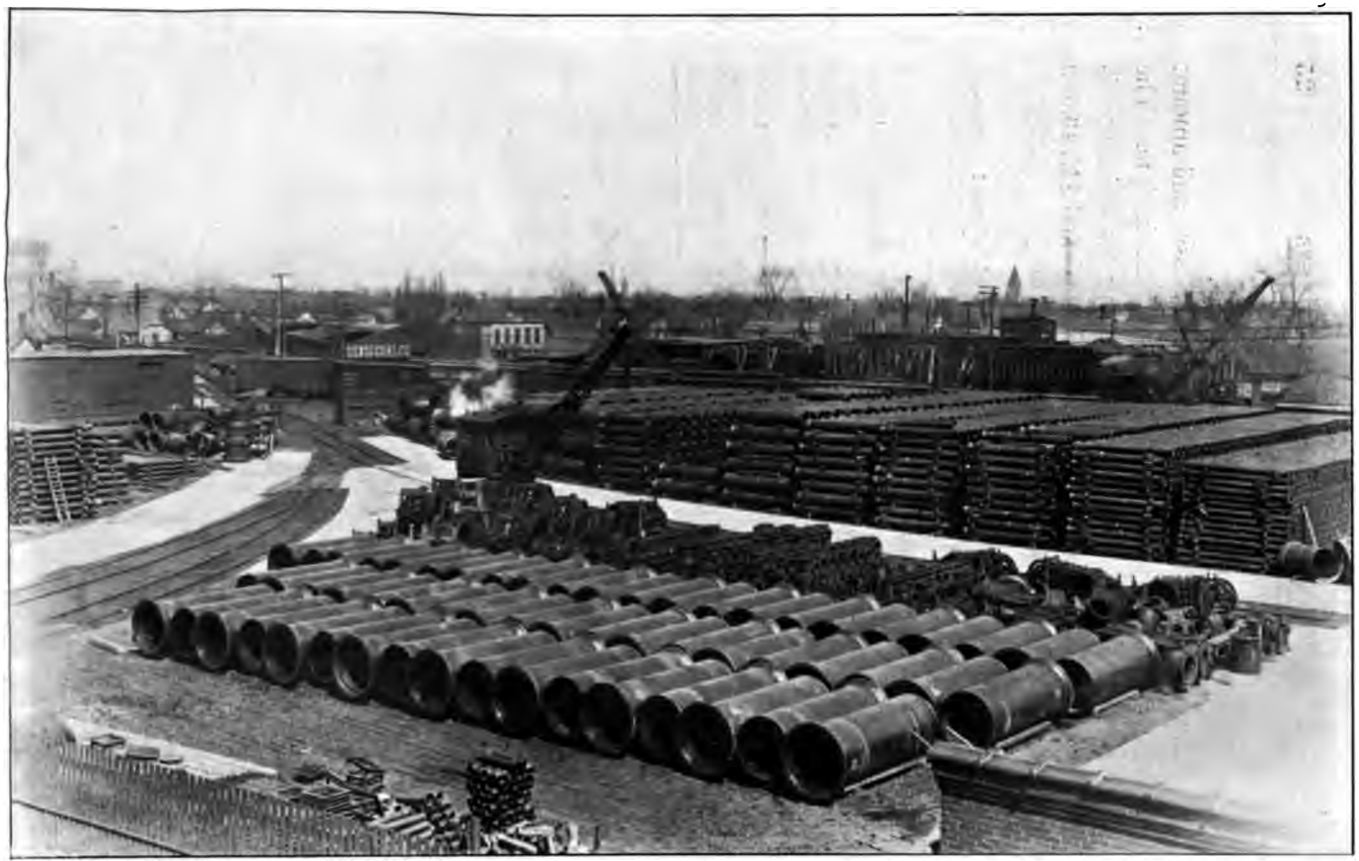
BONDED INDEBTEDNESS.

The following table shows the dates of issue and amount of bonds of this department outstanding at this date. The total amount issued by the Board during its existence is $3,250,000, of which $300,000 were refunded and $1,743,000 redeemed, leaving a balance due of $1,207,000.

No. of Issue	Act of	Issued	Payable	Amount	Rate of Int.	Redeemed or Refnd.	Out-standing
7th Refnd.	1873	Jan. 10, 1895	Jan. 10, 1925	$ 100,000	4%		$ 100,000
	1869	Feb. 1, 1900	Feb. 1, 1930	200,000	3½%	$ 20,000	180,000
	1873	Jan. 1, 1903	Jan. 1, 1933	50,000	3½%		50,000
	1873	Sept. 1, 1903	Sept. 1, 1933	150,000	3½%		150,000
	1901	June 1, 1904	June 1, 1934	200,000	3½%		200,000
Refnd.	1873 1901	Aug. 1, 1904	Aug. 1, 1919	100,000	4%		100,000
	1901	Feb. 1, 1905	Feb. 1, 1935	150,000	3½%		150,000
	1901	Aug. 1, 1908	Aug. 1, 1938	250,000	3½%	75,000	175,000
	1901	July 1, 1909	July 1, 1939	200,000	3½%	98,000	102,000
				1,400,000		$193,000	$1,207,000

Respectfully submitted,

H. A. GILMARTIN,
Secretary.



Eastern Portion of Storage Yard, April 4, 1912.

REPORT OF THE CIVIL ENGINEER.

DETROIT, MICHIGAN, JULY 1ST, 1912.

To the Board of Water Commissioners of the City of Detroit, Michigan.

GENTLEMEN:—Your Civil Engineer hereby respectfully submits a brief report of the work done by and under his direction, for the year ending June 30th, 1912.

POPULATION.

The total number of families within the city limits, as determined by the June census of the Board, was 117,240, and using 4.573 persons per family, as explained in the annual report for the year ending June 30th, 1911, the estimated population is 536,139. This count includes 162 families not supplied with water, and does not include 772 families living just outside the City, but not included in the enumeration of the Villages. The estimated number of persons supplied with water in Detroit is 538,928, and as there are 98,468 taps in the City, there are 5.47 persons per tap. As the estimated population June 30th, 1911, was 498,230, there has been an increase of 40,698, or 8.2% during the past twelve months, with no increase in the area of Detroit by annexation. The increase in population during the two years since June 30, 1910 has been 15.7%.

CONSUMPTION OF WATER.

The consumption of water has increased even faster than the population, as will be seen by the following table.

Consumption of Water in Gallons for Past Five Years

Year	Average Daily per Capita	Average Daily	Per Cent Increase Over Previous Year	Daily Rate at Maximum Hour
1908	167.3	73,380,162		118,114,200
1909	167.5	76,210,276	3.8	132,201,120
1910	174.7	85,260,322	12.1	146,320,320
1911	177.3	92,260,322	8.0	161,937,360
1912	186.6	105,833,013	14.7	168,346,080

The increase during the past year is due in no small degree to the large quantities of water used for sprinkling and cooling purposes during the unusually hot and dry weather in the summer of 1911, and to the wasteful use of water to prevent pipes from freezing during the extremely cold weather of the winter of 1911-12. These abnormal conditions are shown in the following table. The pumpage during the maximum hour was limited by the capacity of the intake tunnel.

Weather Conditions During the Summer of 1911 and Winter of 1911—12.

	July	Aug.	Jan.	Feb.	Mar.
Average Normal Temperature	72.0	69.9	24.3	25.0	32.9
Average, 1911 and 1912	73.6	70.6	13.0	18.3	26.4
Date Maximum	3rd	10th	18th	18th	31st
Date Minimum	26th	30th	5th	10th	2nd
Maximum Temperature	100	90	39	45	55
Minimum Temperature	52	48	-4	-12	+5
Normal Precipitation	3.48	2.77	1.98	2.19	2.37
Precipitation, 1911 and 1912	0.79	1.31	1.99	1.65	2.27

A statement of the quantity of water used in Detroit and the surrounding Villages is given in the following table, the amount used in St. Clair Heights, and the Township of Hamtramck being included with the unmetered water for Detroit; and the per capita consumption in Greenfield township is not included in the general per capita consumption average.

Consumption of Water in Detroit and Villages.

Corporation	U. S. Gallons Supplied July 1, 1911, to June 30, 1912, inclusive		Est. No. Persons Supplied	Gallons per Capita Daily	No. of Taps
	Total	Daily Avg.			
Detroit, unmetered	24,329,572,190	66,474,241	538,928	191.3	98,468
Detroit, metered	13,411,218,700	36,642,674			
Highland Park, metered	358,951,000	980,740	12,198	80.4	2,230
River Rouge, metered	159,298,600	435,242	5,503	79.1	1,006
Ecorse, metered	21,976,200	60,044	1,794	33.5	328
Hamtramck, metered	347,431,000	949,265	6,969	136.0	1,274
Oakwood, metered	35,367,700	96,633	487	199.0	89
Grosse Pointe, metered	12,424,300	33,946	340	99.8	62
Greenfield Township	58,643,200	160,228	164	977.0	30
Totals	38,734,882,890	105,833,013	566,383	186.6 (Average)	103,487

The general statistics regarding the total consumption are as follows:

Maximum Day, Feb. 12, 1912	147,463,280 gals.
Minimum Day, Dec. 24, 1911	75,735,210 gals.
Average Daily (Entire System)	105,833,013 gals.
Average Daily (High Service)	23,535,776 gals.
Average Daily (Low Service)	82,297,237 gals.
Total for Year	38,734,882,890 gals.
Maximum Hour (Entire System) Feb. 12, 1912, 8 to 9 A. M.	7,014,420 gals.
Minimum Hour (Entire System) Nov. 20, 1911, 3 to 4 A. M.	2,181,350 gals.
Maximum Hour (High Service) July 4, 1911, 8 to 9 A. M.	1,920,000 gals.
Maximum Hour (Low Service) Feb. 12, 1912, 8 to 9 A. M.	5,514,420 gals.
RATE PER DAY AT MAXIMUM HOUR (Entire System)	168,346,080 gals.
Rate per Day at Minimum Hour (Entire System)	52,352,400 gals.

The maximum daily consumption was 139%, the minimum daily consumption was 72%, the maximum hourly consumption was 154%, and the minimum hourly consumption was 49% of the average in each case.

The Fire Department used 22,913,261 gallons of water at 663 fires. Fire engines worked a total of 85,400 minutes and took 22,130,096 gallons of water from 900 hydrants in 82,115 minutes and took 783,165 gallons from 42 street reservoirs in 3,285 minutes. The average use of each of the above mentioned hydrants was 91 minutes at 270 gallons per minute, and of each of the reservoirs 78 minutes at 238 gallons per minute.

There are now 5,849 steamer hydrants and 532 reservoirs in use, an increase of 255 hydrants and a decrease of 4 reservoirs during the year. The Fire Department set 486 and removed 231 hydrants.

The rapid increase in the pumpage of water in Detroit is due to an increase in the per capita consumption as well as to the additional population.

WATER PRESSURES.

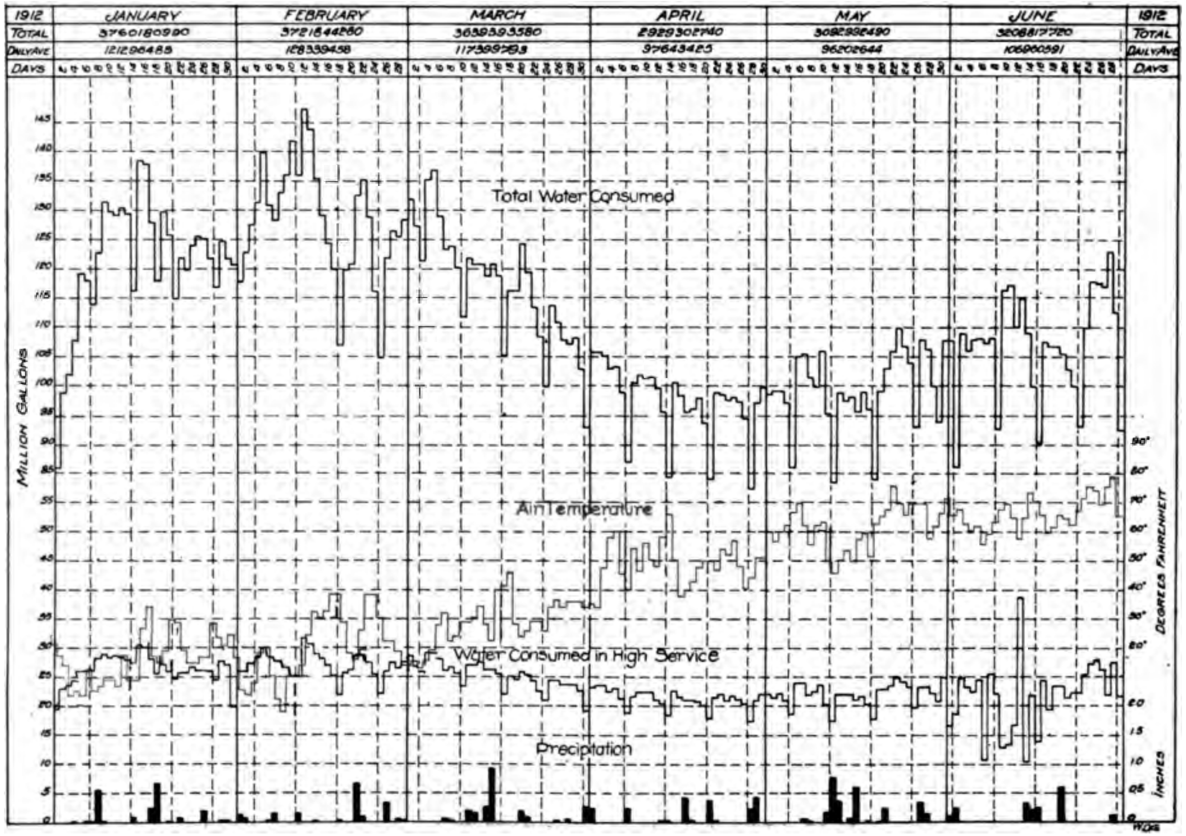
There has been a general decrease in pressures during the year throughout the City and Villages, although the difference has been much more marked in the low service than in the high service district. This is due to the benefit afforded the latter district by the completion of the 42-inch main in St. Aubin Ave., from Palmer to the North Boulevard. Some of the points where average pressures have decreased are given, in pounds, as follows: At Cobb and West Boulevard, from 20.35 to 17.42; 16th and Grand River, from 19.28 to 16.23; Russell and Erskine, from 21.28 to 19.08; Grandy and Gratiot, from 28.45 to 26.59; Michigan, near Hammond, from 25.86 to 22.62; Scotten, near Michigan, from 28.97 to 25.97; Fort and Lewerenz, from 28.86 to 26.43; 16th and Bagg, from 26.65 to 22.41; Hastings near Congress, from 32.43 to 29.65; Water Office, from 28.20 to 25.74. As pressures at the pumps which supply the low service have remained very nearly the same as during the previous year, this decrease in pressures is due to increase in friction in the mains, because of greater consumption of water.

Table of Pressures.

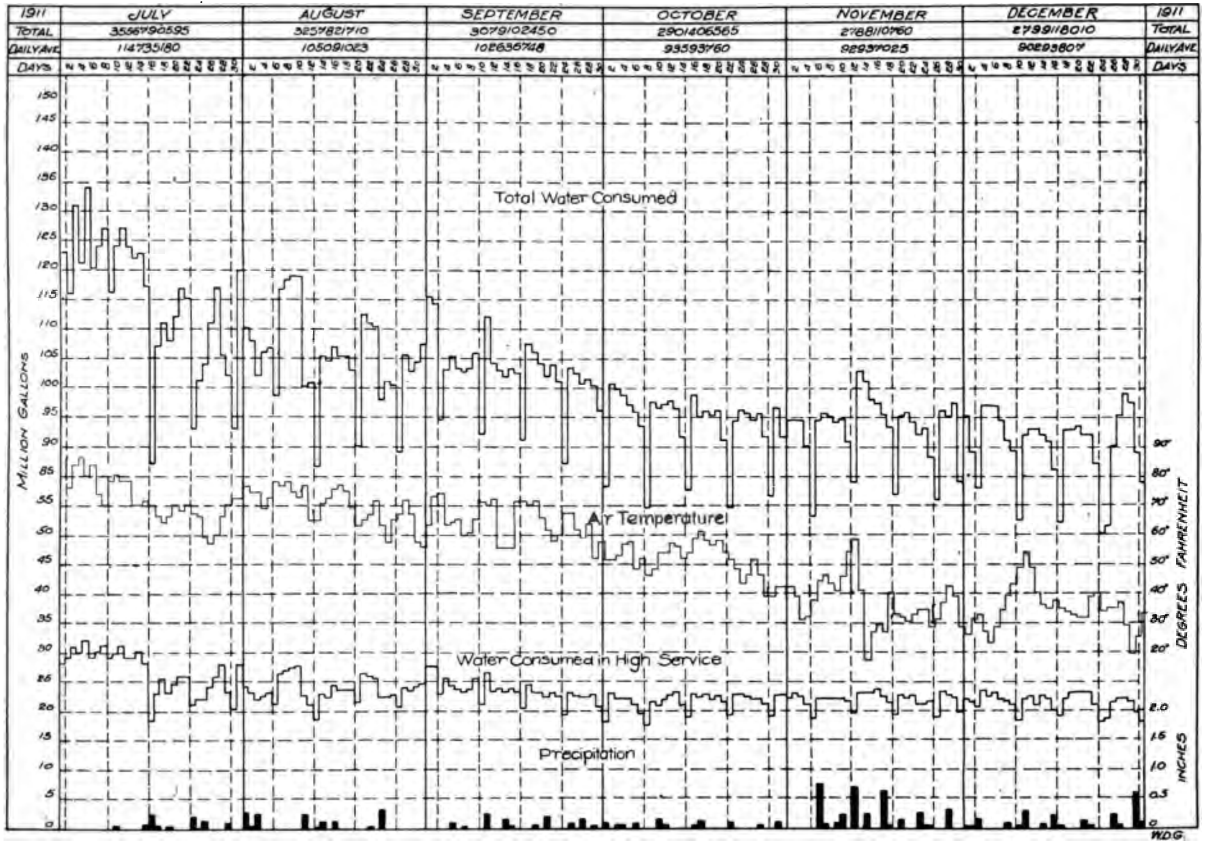
	LOCATION OF GAUGES	Elevat'n above City Datum	Elevat'n above surface pump wells (92.00) at which engine gauges are set	July 1, 1910 to June 30, 1911. Average Daily Consumption 92,260,322 gallons Total Consumption for Year 33,675,017,355 gallons				July 1, 1911 to June 30, 1912. Average Daily Consumption 105,833.013 gallons Total Consumption for Year 38,734,882,890 gallons				Increase or Decrease in Friction During last Year		Maximum Hour observed Feb. 12, 1912 7,014,420 gals. 8 to 9 a m. Daily Rate 168,346,080 gals.		Minimum Hour observed Nov. 20, 1911 2,181,350 gals. 3 to 4 a. m. Daily rate 52,352,400 gals.	
				Pressures, Pounds			Fric. Loss Lbs.	Pressures, Pounds			Fric. Loss Lbs.	Pounds		Average Pressure Lbs.	Fric. Loss Lbs.	Average Pressure Lbs.	Fric. Loss Lbs.
		Feet	Pounds	High.	Low	Mean		High.	Low	Mean		Inc.	Dec.				
Low Service	Pumping Station	92.000	....	61	45	53.81	....	63	56	53.96	....	......	......	58.87	....	48.50	....
	Engine No. 32, Vanda and Jefferson	103.419	4.45	55	35	46.51	2.36	56	38	47.26	2.25	......	.11	51.00	3.42	44.50	.45
	Engine No. 26, Crane and Brinkert	125 787	14.62	43	30	36.26	2.93	44	26	36.38	2 98	.05	......	40.50	3.75	33.00	.88
	Engine No. 7, Concord near Jefferson	124.773	14.19	42	30	36 94	2.68	43	28	35.84	3.93	1.25	......	40.00	4.68	35.50	1.19
	Engine No. 19, Congress near Jos. Campau	122.473	13.19	43	25	36.80	3.82	42	24	37.57	3.20	......	.62	37 00	8.68	33.50	1 81
	Engine No. 2, Hastings near Congress	120.981	12.55	40	21	32.43	8.83	36	22	29.65	11.76	2.93	......	29.50	16 82	33.00	2.95
	Water Office, Randolph and Jefferson	125.176	14.36	34	18	28.20	11.25	32	20	25.74	13.86	2.61	......	24.00	20.51	29.00	5.14
	Engine No. 3, Griswold and Clifford	123.059	13.44	35	21	29.02	11.35	32	16	27.73	12.79	1.44	......	25.00	20.43	30.00	5.06
	Engine No. 8, Sixth and Baker	122.144	13.05	36	19	29.65	11 11	34	21	27.94	12.97	1.86	...	25.00	20.82	31.50	3.95
	Engine No. 4, Eighteenth near Howard	116.179	10.47	36	17	29.36	13.98	33	20	27.21	16.28	2.30	......	25.00	23.40	32.50	5.53
	*Engine No. 10, Sixteenth and Bagg	125.282	14.41	35	14	26.65	12.75	29	11	22 41	17.14	4.39	......	....	....	....	....
	Engine No. 15, Hubbard near Fort	114 617	9.74	38	19	31.35	12.67	36	21	28.96	15.21	1.44	......	24.00	25.08	33 00	5.71
	Engine No. 29, Solvay and Jefferson W.	115.052	9 98	40	16	31.72	12.11	35	19	27.76	16.22	4.11	......	27.50	21.39	34.50	4.02
	Truck No. 13, Fort and Lewerenz	115.564	10.20	37	10	28.86	14.75	35	17	26.43	17.33	2.58	.	20.50	28 17	31.50	6 80
	Engine No. 27, Junction and Rogers	113.736	9.41	39	15	30.97	13.43	36	19	28.35	16.20	2.77	......	22.50	26.96	34.00	5.09
	Engine No. 14, Scotten near Michigan	121.368	12.71	36	13	28.97	12 13	33	17	25.97	15.28	3.15	......	20.00	26.16	31.00	4 79
	Engine No. 22, Michigan near Hammond	119.144	11.88	34	12	25.86	16.07	31	14	22 62	19.46	3.39	......	15.00	31.99	29.50	6.29
	Truck No. 10, Sheridan and Mack.	140.254	20.89	35	20	28 23	4.69	35	19	27.54	5.33	.84	......	30.50	7.48	26.50	1.11
	Engine No. 18, Mt. Elliot near Sylvester	146 233	23.48	32	18	25.56	4.77	31	16	24.79	5.69	.92	.....	27.50	7.89	24.00	1.02
	Engine No. 11, Grandy and Gratiot	143.211	22.17	36	23	28.45	3.19	33	15	26.59	5.20	2.01	......	28.00	8.70	25.00	1.13
	Engine No. 6, High near Hastings	142.631	21 92	30	12	24.72	7.17	30	16	23.73	8.31	1.14	......	24.50	12.45	23.00	3.58
	Storage Yard, Orleans and Erskine	150.635	25.38	26	12	19.71	8.72	24	12	18.19	10.39	1.87	......	18.00	15.49	19.50	3.62
	Truck No. 5, Russell and Erskine	147.742	24.13	27	8	21.28	8.40	25	9	19.08	10.75	2.35	......	17.00	17.74	20.00	2.37
	Engine No. 5, Alexandrine near Cass	148.482	24 45	28	8	18.99	10.37	25	10	17.21	12.30	1.93	......	16.00	18.42	20.00	4.05
	Engine No. 12, Sixteenth and Grand River	141.546	21.45	26	6	19.28	13.08	23	10	16.23	16.28	3.20	......	12 00	25.42	20.00	7 05
	Engine No. 31, Cobb and W Grand Blvd.	135.115	18.66	28	6	20 35	14.80	25	9	17.42	16.88	2 08	......	11.50	28.71	23.00	6.34
	Engine No. 20, Baldwin and Gratiot	145.368	23.10	34	16	26.67	4.04	34	18	26.08	4.78	.74	......	28.00	7.77	24.50	.90
High Service	Pumping Station	92.00	....	100	58	72.48	....	95	55	70.94	....	......	......	83.50	....	62.25	....
	Engine No. 18, Mt. Elliot near Sylvester	146.283	23.48	57	32	42.33	6.67	50	30	38.95	8.51	1.84	......	40.00	20.02	37 00	1.77
	Engine No. 23, Moran and Boulevard	154.288	26.96	50	28	35.41	10.11	43	23	33.00	10.98	.87	......	35.00	21.54	32.00	3.29
	Engine No. 28, Riopelle and Milwaukee	155.556	27.52	38	18	29.34	15.62	39	22	29 82	13.60	......	2.02	31.00	24.98	30.50	4.23
	Engine No. 13, Russell and Ferry	157.304	28.27	41	21	30 19	14.02	39	22	28.78	13.89	......	.13	27.50	27.73	30.00	3.98
	Engine No. 17, Cass and Amsterdam	152.825	26.33	38	10	28.17	17.98	34	15	27.39	17.22	......	.76	23.00	34.17	30.00	7.83
	Engine No. 21, Lincoln near Piquette	154.880	27.22	38	11	29.09	16.17	35	13	26.88	16.84	.67	......	23 50	32.78	30.00	5.03
	Engine No. 24, Kenilworth near John R	155 855	27.64	34	8	26.06	18.78	34	11	26 11	17.19	......	1.59	22.00	33.86	28.50	6.11

* No readings between August 28, 1911, and April 11, 1912.

DAILY WATER CONSUMPTION, AVERAGE TEMPERATURE AND PRECIPITATION



Daily Water Consumption, Average Temperature and Precipitation



DISTRIBUTION SYSTEM.

The distribution system has grown rapidly. During the past twelve months slightly more than 35 miles of pipe were laid, and a little more than 4½ miles were discontinued, making a net increase of 30½ miles. Included in this work are the following lines of large mains:—

Laid 8,209 feet of 42-inch pipe in St. Aubin, from Palmer to near Holbrook. Began work April 10, 1911, and put in service to the North Boulevard, July 18, and to near Holbrook Nov. 29th, 1911. This pipe weighs 645 pounds per foot, and cost $22.50 per ton. The cost of labor was $3.72 and the total cost of the job was $13.78 per foot.

Laid 2,952 feet of 42-inch pipe in Jefferson Ave. West, from Solvay to White streets. Began May 25, 1911, and put in service Sept. 14, 1911. This pipe weighs 645 pounds per foot, and cost $22.50 per ton. The cost of labor was $2.77, and the total cost of the job was $13.66 per foot.

Laid 2,720 feet of 48-inch pipe in High street, from East of St. Antoine to West of Woodward. Began work July 16, 1911, and put in service Jan. 16, 1912. This pipe weighs 829 pounds per foot, and cost $22.50 per ton. The cost of labor was $6.49, and the total cost of the job was $20.95 per foot.

Laid 966 feet of 48-inch and 412 feet of 42-inch pipe in Gladwin Park and crossing Jefferson Ave. to Bewick, at a total cost of $37,150.62, of which $13,094.13 was for labor. This pipe, the 48-inch main in Bewick, South of Mack Ave., and the 42-inch main in Mack, between Bewick and Hurlbut Aves., were put in service June 6, 1912.

Began work April 15, 1912, in the West side of Garland Ave., between Jefferson and Kercheval, and 1,100 feet of 48-inch pipe have been laid to June 30th.

Lowered the 24-inch pipe in the North Boulevard, for the Russel St. Subway. The main was out of commission 83 hours and was turned on Dec. 6, 1911.

All work on the 16-inch submerged pipe across the River Rouge at Jefferson Ave. West had been completed Sept. 5, 1911.

DISTRIBUTION SYSTEM.

Size in Inches	Laid During Year Feet	Laid During Year Per Ct.	Discontinued During Year Feet	Total in System June 30, 1912 Feet	Total in System June 30, 1912 Per Ct.	Total in System June 30, 1908 Feet	Total in System June 30, 1908 Per Ct.	Total Feet Outside Detroit June 30, 1912	No. of Gates in System June 30, 1912
2				4,624	.104	4,624	.120		
3			304	53,193	1.198	60,344	1.568		20
4	1,685	.908	19,581	793,050	17.873	860,378	22.375	33,678	1,929
6	54,674	29.473	4,389	2,118,303	47.741	1,879,943	48.863	299,582	4,297
8	76,954	41.484	143	650,054	14.650	431,970	11.265	110,769	1,488
10	5,564	3.000	41	242,404	5.463	221,306	5.770	8,143	505
12	24,182	13.037		173,483	3.910	85,223	2.248	12,220	317
16	5,819	3.137		88,005	1.983	57,230	1.490	3,292	107
18				87	.002	87	.002		2
20				393	.008	393	.010		10
24	1,455	.784	4	92,822	2.092	87,765	2.292		77
30			6	54,629	1.231	54,627	1.430		39
36				7,948	.179	7,890	.205		6
42	11,465	6.180		113,454	2.557	90,779	2.369		74
45				103	.002	103	.003		
48	3,697	1.939		44,612	1.005				19
Totals	185,495	99.942	24,468	4,437,164	99.998	3,842,662	100.010	467,684	8,890
Miles	35,131		4.634	840.391		727.76		88.576	

Began the extension of the 48-inch main in Twelfth St., near the North line of Michigan Ave. and in High St., East from Twelfth, June 24, 1912, but no pipe has been laid to date.

Between May 14, 1912, and the date of this report, 2,658 feet of 24-inch pipe were laid in Holbrook Ave. East of Woodward Ave.

More than six miles of pipe have been laid in 39 streets to provide for better fire protection, as follows:

6-inch pipe	1,055	feet	$ 1,504.73
8-inch pipe	18,239	feet	32,005.33
10-inch pipe	1,030	feet	2,099.60
12-inch pipe	12,199	feet	33,752.03
Total	32,523	feet	$69,361.69

The total cost of all pipe laying work for the year was $509,029.78, of which approximately 30% was paid for labor. The cost of this work in Detroit and Villages is summarized as follows:

Summary of Pipe Laid in Detroit and Villages.

					Cost of Construction		
Corporation	Size	Feet	Size	Feet	Material, etc.	Labor	Total
Detroit	4″	1,685	12″	22,002			
	6″	29,592	16″	3,458			
	8″	51,610	24″	1,455			
	10″	5,564	42″	11,465			
			48″	3,697	$291,741.01	$152,506.54	$444,247.55
(Villages)							
Highland Park	6″	9,937	8″	11,667			
			16″	2,196	21,459.27	11,847.32	33,306.59
St. Clair Heights	6″	1,608	8″	4,150	4,216.21	2,515.13	6,731.34
Hamtramck	6″	2,531	8″	3,411	3,795.65	1,677.42	5,473.07
Oakwood	6″	11,006	12″	2,180			
	8″	4,100	16″	165	11,733.52	4,936.73	16,670.25
River Rouge	8″	2,016			1,903.45	697.53	2,600.98
Totals		185,495	feet		$334,849.11	$174,180.67	$509,029.78

Record of Breaks in Water Mains from 24 inches to 48 inches in Diameter Between July 1, 1911 and June 30, 1912.

Location	Gladwin Park	Hurlbut Ave. N. of Kercheval	Elmwood Ave. N. of Milwaukee	Bagg and Greenwood	Jefferson & Sheridan	Champlain & Leib
Date and Time	Jan 31, 5:00 P. M.	Feb. 8, 2:50 P. M.	Feb. 17, 6:25 A. M.	Feb. 20, 6:15 A. M.	Mar. 5, 8:00 P. M	Mar. 20, 3:00 P. M.
Size of Pipe	42" Cast Iron	42" Cast Iron	30" Cast Iron	24" Cast Iron	42" Cast Iron	42" Cast Iron
Pressure on Pipe Before Break	76 lbs.	76.5 lbs.	54.3 lbs.	27 lbs.	46.1 lbs.	44.5 lbs.
Daily Rate of Pumpage at Time of Break	120,917,580 gal.	133,215,075 gal.	119,877,150 gal.	105,786,720 gal.	137,078,220 gal.	124,559,025 gal.
Nature of Break	Piece Broken from Hub	Piece Broken from Hub	Piece Broken from Middle	Crack, 5' 6" long on Bottom	Piece Broken from Hub	Crack, 10' 0" long from Spigot End.
Year Pipe was Laid	1902	1902	1891	1867	1875	1895
Made by	American Car & Fdy.	American Car & Fdy.	Detroit Pipe & Fdry.	R. D. Wood & Co. Pha.	Lake Shore Fdry. Co. Cleveland	Mich. Pen. Car Co.
Least Thickness of Pipe	1.28 Inches	1.375 Inches	0.94 Inches	0.65 Inches	1.12 Inches	1.37 Inches
Depth of Frost	3' 6"	4' 8"	4' 0"	5' 10"	5' 3"	5' 6"
Depth of Pipe	7' 7"	5' 0"	6' 0"	3' 10 "	6' 8"	4' 4"
Tensile Strength per Square Inch	9,933—22,249	11,105—18,348	22,733—20,155	17,065—13,250	11,996	17,430—17,319
Transverse Strength	2,211—2,111	2,090	1,877—1,805	1,611	1,310	2,030
Silicon Present in Iron	2.28%	1.99%	1.78%	3.04%	2.35%	2.07%
Sulphur Present in Iron	0.059%	0.067%	0.081%	0.090%	0.148%	0.078%
Phosphorus Present in Iron	1.103%	1.191%	0.801%	0.759%	0.870%	0.828%
Manganese Present in Iron	0.52%	0.44%	0.31%	0.39%	0.16%	0.30%
Combined Carbon in Iron	0.55%	0.60%	0.64%	Trace	1.48%	0.47%
Graphitic Carbon in Iron	2.64%	2.58%	2.58%	3.07%	1.79%	2.90%

The following comparison between the average daily pumpage and the cubic contents of the pipeage distribution system shows there has been no relative change in these since 1908.

Year Ending June 30	Average Daily Pumpage Gallons	Cubic Contents of Distribution System Gallons	Percentage Contents is of Pumpage
1908	73,380,162	17,493,671	23.8%
1909	76,210,276	20,036,629	26.3%
1910	85,411,383	21,343,000	25.0%
1911	92,260,322	23,540,144	25.5%
1912	105,833,013	25,214,748	23.8%

Some trouble has been experienced with electrolysis. It was necessary to remove 276 feet of 4-inch pipe from Crawford Ave., South of Fort St., because of deep pitting in many places, and on investigation it was found this line carried 35 amperes during the time of the peak load of the Detroit United Railway. The company referred to placed bonds at four places: A 1 mil. c. m. copper cable return from 6-inch gas and 8-inch water pipes at Harper and Gratiot Aves. to the Leesville power house; at St. Aubin and Trombly Aves., gas and water mains bonded and current flows East to Dubois St. and then to power house by cable; at Larchmont and Grand River Aves. the 4-inch gas and 6-inch water pipes are bonded and connected to Edison Co.'s substation at this corner with 1 mil. c. m. copper cable. At Rademacher and West Jefferson Aves., the 42-inch main is connected by return feeder to the Edison Co.'s substation. At Bethune and Oakland two gas mains are bonded to a 10-inch water main.

During the winter of 1911-12 frost extended to a depth of over five feet in many places in paved streets, and while few water mains suffered, probably more than one thousand service connections were frozen. In some cases connections remained frozen till spring, but usually they were thawed with electrical machines operated by plumbers. Because of the extended trouble arising from frozen pipes, the Board, on May 21, 1912, directed that all service connections placed hereafter shall be covered to a depth of five feet in paved streets and 5½ feet in unpaved streets.

In an accompanying table are given data concerning the six breaks in large mains which occurred during the year; one in January, three in February and two in March.

A complete flushing of all pipes was made between Nov. 23, 1911, and January 30, 1912. Usually the larger mains were found to be comparatively free from sediment, but the smaller pipes, especially those six inches in diameter and smaller, were found to contain some mud. The last complete systematic flushing was made in 1907.

The work of making the necessary connections for changing the dividing line between the high and low services, from Woodward Ave. to Linwood Ave. is now under way. The present line of division, which crosses Cass and Second Aves. at Forest, Fourth Ave. at Warren, Brooklyn and Trumbull at Putnam, Avery and 12th at Merrick, Fifteenth, Sixteenth and Stanton at Kirby, will be changed to follow Canfield Ave. from Woodward to Third, thence along Calumet and Grand River Ave., to Sixteenth and across Stanton at Merrick. In the district in question, which is about one and one-half miles long, and one-half mile wide at Commonwealth Ave., pressures will be increased about ten pounds.

VILLAGES.

Ecorse was the only Village in which no pipe was laid during the year. The supply for Grosse Pointe Parks has been passed through an eight inch meter since January 20,

1912. The Villages of St. Clair Heights, Hamtramck and River Rouge have each laid a moderate amount of small distribution pipes, and on Sept. 5, 1911, all work on the 16-inch submerged pipe across the River Rouge at Jefferson Ave. West was finally completed. Highland Park has arranged to have a 16-inch line laid in Hamilton Boulevard, and already 2,196 feet of this main have been placed, besides 11,667 feet of 8-inch and 9,937 feet of 6-inch pipe, for distribution purposes.

The distribution system for the new Village of Oakwood has been completed. On July 27, 1911, a limited supply was furnished through a temporary four-inch connection. On March 1, 1912, a contract was entered into with George Lockerbie to lay a 24-inch submerged pipe line across the River Rouge, 159 feet North of the North line of Fort St., at $18.00 per foot, the pipe and joints to be furnished by the Board, and already this work has been partly completed.

The three Villages of Hamtramck, River Rouge and Ecorse, are insufficiently supplied with water. The trouble in Hamtramck can be easily remedied by placing more meters at the City Limits; for since the completion of the 42-inch main along the City Limits in St. Aubin Ave., no shortage exists in the districts adjoining the Village. The shortage of water in River Rouge and Ecorse is quite a serious matter, and one that must receive due consideration in the immediate future. Pressures are frequently less than ten pounds, and at times it is only possible to secure water by operating the fire pump.

INTAKES.

On seven occasions it became necessary during the past winter to open the upper six-foot iron intake in order to reinforce the supply received through the ten foot brick tunnel. The ports at the intake tower and the tunnel were evidently clear of ice, but because of the extremely high pumpage, both intakes were needed to furnish the necessary supply. When the iron intake was opened, at the dates mentioned below, hypochlorite of lime, at the rate of 21½ pounds per hour, was added to the water received from that intake: —February 5th, 7 hours; 12th, 8½ hours; 13th, 7½ hours; March 1st, 5½ hours; 4th, 6½ hours; 5th, 2½ hours; 6th, 3 hours; a total of 40½ hours.

Work has been started on a four ring brick conduit having an internal diameter of 7 feet 2 inches, to convey water into the West end of the new pumping station.

PUMPING STATIONS AND GLADWIN PARK.

Contractors on the new pumping station, under the direction of architects, have completed the brick and stone work for the engine room, except cleaning and pointing; have completed the concrete work for the roof and laid 1,600 square feet of concrete for the basement floor; and have started work on the tile roofing, stone carving and ornamental iron work.

At the new pumping station the Board has received three transformers, the bridge and truck for the 30 ton traveling crane, and seven 72-inch gates; stripped forms from water gallery floor and roof; laid 795 feet of four duct electric conduit from Jefferson Ave., with three wells; and built temporary house and set up Venturi meter register No. 8, on 48-inch high pressure main leading up Bewick Ave. The contract for the electric crane was awarded October 24, 1911, for $4,787. At the old pumping station October 28, 1911, testing engineers determined the duty of the Holly 25 million gallon vertical, triple expansion pumping engine. During a run of ten hours, with steam pressure at the throttle of 138.85 pounds, barometer 29.43 inches, temperature of water pumped 50.6° F., percentage of moisture in steam leaving separator 1.052, average total water pressure across pump 75.8 lbs., and no allowance for slip; the mechanical efficiency of the engine was 90.45%, the pounds of dry steam per I. H. P. was 10.332, the pumpage during test was at the rate of 26,231,836 gallons per day, the duty based on one million B. T. U.'s (A. S. M. E. standard method) was 150,566,700, and the duty based on 1,000 lbs. of dry steam was 173,119,575. The steam cylinders are 32x60x90 inches in diameter, the water plungers are 37½' inches in diameter, and the stroke is 66 inches.

On May 31, the Board directed the architects to proceed with plans for the construction of an extension to the Boiler House for the old pumping station, to contain four 400 H. P. boilers, and a brick stack 10 ft. x 150 ft., and on June 29th contracts were awarded for four 400 H. P. vertical Wickes water tube boilers, and four automatic stokers, with two engines, made by the Detroit Stoker Co.

A considerable amount of miscellaneous work has been done in Gladwin Park, including extension of fill at river front; sidewalk repairs; construction of concrete curbs, driveways and steps; repairs to drinking fountain foundations; building of hypo plant; and re-painting of library. The 42-inch Venturi meter tube No. 6 was moved further North, and Venturi meter register No. 7 was put in place in the pumping station. A total of 793 feet of 48-inch and 209 feet of 42-inch straight pipe, and 173 feet of 48-inch and 103 feet of 42-inch special castings and gate valves were laid, including four 48-inch valves and four 48-inch Y's in front of the new station, and five 42-inch gates, one 48-inch Y and two 42-inch Y's in front of the old station.

Storage Yard.

The work done at and from the Storage Yard may be classified under two heads, "Work Done in Storage Yard," and "General Work." The former includes all work and material required for construction, operation, and maintenance of the Yard itself, and all overhead charges for its operation, including all superintendence and clerical work. The latter includes all work done outside of the Yard by men from the Yard. These various operations with costs, are summarized in the following tables:

Work Done in Storage Yards.

Laying 3,680 sq. ft. of concrete driveway in East Yard, north of railroad spur and draining same, with 240 ft. of 4", 76 ft. of 6" and 263 ft. of 8" tile	$ 1,864.05
Laying 3,940 ft. of brick pavement from old barn to Orleans St. gate, north side of stock room	1,776.30
Laying drain and concrete driveway around special castings platform in West Yard	2,738.23
Laying 1,480 sq. ft. of concrete driveway and drain for same, from the railroad spur to the shop door	437.58
Loading and unloading, checking and storing materials and cleaning and trimming pipe	8,356.53
Cleaning and caring for lanterns, 10 tapping machines and other equipment	1,052.44
Night clerk, watching, care of yards and office	3,590.97
Caring for stables, 27 horses, 19 light wagons, 4 double trucks, 4 single trucks, 1 42" pipe wagon, 1 48" pipe wagon, 2 patent dump dirt wagons (Not including hired rigs)	3,557.32
Cleaning and care of 8 automobiles	1,084.55
Repairing wagons	610.07
Night, Sunday and holiday emergency	1,768.43
Horseshoeing	362.24
Making and repairing tools	2,628.71
Clerks	7,368.41
Total	$37,195.83

General Work.

Tapping mains and inserting 2,322 1" and 4,492 ⅝" service cocks	$ 9,044.36
Setting 200 sleeves and valves	4,365.32
Setting 12 public drinking fountains	929.53
Building wells over private gates on permits	61.92

Examining, repairing, cleaning and setting to grade all gate wells and gate boxes in the system	2,725.60
Examining, repairing and greasing all gates in the system	6,956.99
Repairing 128 leaks and breaks in mains	7,556.79
Attending to 850 leaks in service connections	3,254.40
Attending to 158 false reports of leaks	227.61
Opening blow-off gates to flush dead ends	3,837.68
Shutting service connections on account of non-payment of taxes, leaks, etc., and letting on same	281.31
Examining air chambers for water hammer	139.49
Examining hydraulic elevator connections	7.59
Attending "No Water" and short supply complaints	559.94
Examining private connections and fire plants	452.83
Repairing sunken trenches	262.61
Caring for drinking fountains	613.32
Attending to lights at crib	403.42
Laying cement sidewalks, curb and driveways and setting hydrants at Gladwin Park	531.56
Killing 6-inch and 4-inch mains	236.03
Material supplied by Storage Yards and billed to outside parties	5,189.59
Work done at Pumping Station and Gladwin Park	585.14
Miscellaneous work done and billed to outside parties	10,951.61
Miscellaneous work done at Emergency Station	18.29
Miscellaneous work done at Meter Shop, and assisting meter readers	1,016.27
Miscellaneous work done for Engineering Department	53.21
Miscellaneous work	388.25
	$60,650.66

There are now 123 sanitary street drinking fountains, of which 12 were set during the past year.

METER SHOP.

All work of setting, removing, repairing and testing meters is carried on at the meter shop at the Storage Yard.

Number of Meters Placed and Removed.

	⅝"	¾"	1"	1½"	2"	3"	4"	6"	8"	Ind.	Total
In Service July 1, 1911	5,194	1,795	1,402	509	465	188	119	41	.	35	9,748
Placed during year	1,613	564	294	51	54	16	21	16	1	..	2,632
	6,807	2,359	1,696	560	519	204	140	57	1	35	12,380
Removed during year	908	370	241	21	21	9	2	..	.	1	1,573
Total in Service, June 30, 1912	5,899	1,989	1,455	539	498	195	138	57	1	34	10,807

At the beginning of the fiscal year there were 93,166 service connections, of which 9,713, or 10.4% were metered; and on June 30, 1912, there were 98,468 connections, of which 10,807, or 11.0% were metered. During the year ending June 30, 1911, 35.7% of all water pumped passed through meters, and the receipts for this metered water amounted to 42.2% of all moneys received by the Board as water rates; while during the past year 37.2% was metered water, and the income amounted to 42.2% or the same as the previous year. The number of service connections herein given should be considered as approximate only.

The cost of setting, removing, repairing and testing meters during the fiscal year was $8,278.24, and the cost of new meters was $13,454.12, making a total cost of $21,732.36, for all work done and material used by the department for meters.

EMERGENCY STATION.

Since May 15th the two electric trucks have been used during the day for tapping purposes. The original batteries which were in the cars in 1907 had so far deteriorated that in that month it became necessary to replace them with new batteries of the 40 cell high duty type, of 243 ampere hour capacity. At present 4 men are on duty each night from 6 P. M. till 6 A. M.

CIVIL ENGINEERING DEPARTMENT.

There are now 275 private fire plants in Detroit, of which 36 are metered and 153 maintain an excess pressure. The further installation of direct pressure lines has been prohibited by the Board.

The following explains some of the routine work of this office.

Private fire plants examined	826
Furnished plumbers' locations of street mains	3,256
Petitions for laying pipe received	336
Tons of cast iron pipe inspected and accepted	8,998
Tons of cast iron pipe inspected and rejected	887
Number of blueprint sectional maps furnished, each containing 73 sheets	54

Surveys have been made and grades given for all pipe lines 12 inches or larger in diameter. All valves and special castings have been inspected in the shop. The electric trucks at the Emergency Station are looked after by this Department.

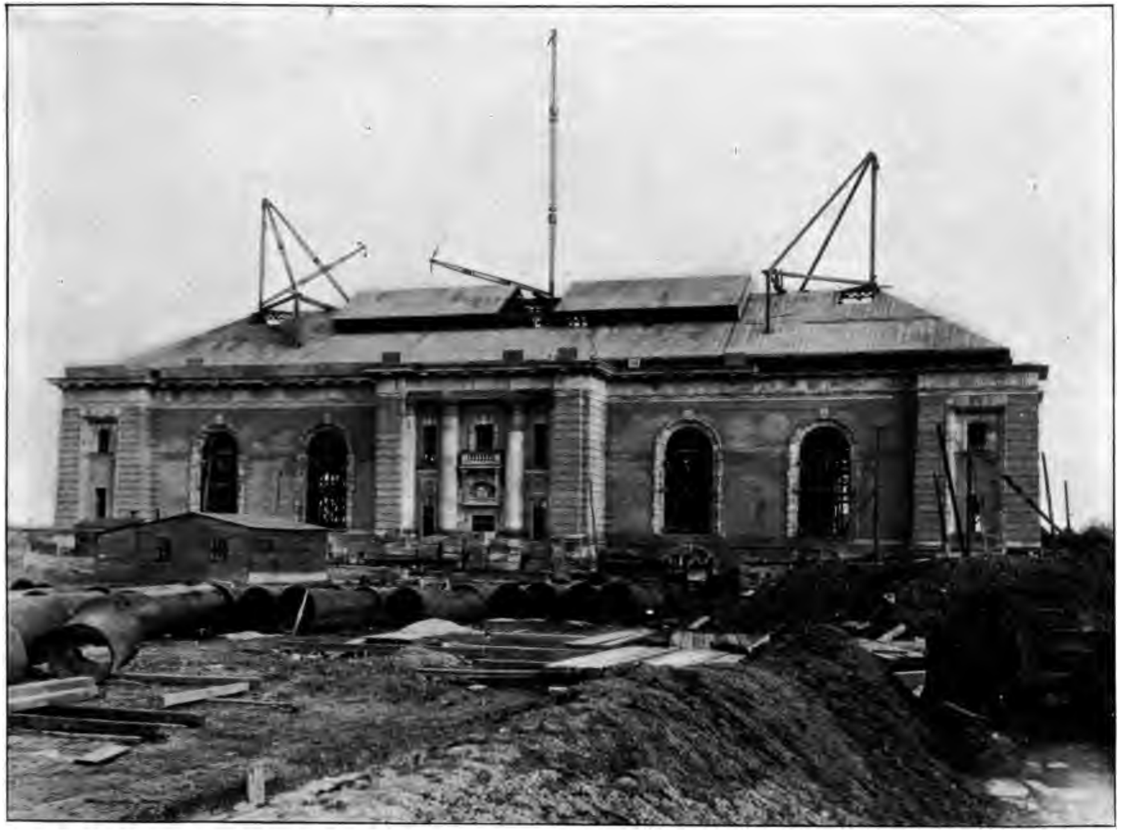
SUMMARY OF STATISTICS.

Attached is a partial summary of statistics, in the form recommended by the New England Water Works Association, compiled jointly by the Secretary and the Civil Engineer, from information obtained from all the Departments.

Yours respectfully,

GEORGE H. FENKELL,

Civil Engineer.



New Pumping Station, April 4, 1912.

SUMMARY OF STATISTICS

For the Year Ending June 30, 1912.

In form recommended by the New England Water Works Association.

Detroit, Michigan, Water Works,
Detroit, Wayne County, Michigan.

GENERAL STATISTICS.

Population by U. S. Census, 1910, 465,766.

Date of construction, 1827 to date.

By whom owned, The Board of Water Commissioners of the City of Detroit.

Source of supply, Detroit River, near Lake St. Clair.

Mode of supply (whether gravity or pumping) pumping.

PUMPING STATISTICS.

1. Builders of Pumping Machinery—
   - One 24 Million gal., Compound Beam, Detroit Locomotive Works, Detroit, Mich.
   - One 24 million gal., Compound Beam, Riverside Engine Works, Detroit, Mich.
   - One 30 million gal., Compound Beam, Riverside Engine Works, Detroit, Mich.
   - One 24 million gal., Triple Expansion, E. P. Allis & Co., Milwaukee, Wis.
   - Two 25 million gal., Triple Expansion, Allis-Chalmers Co., Milwaukee, Wis.
   - One 25 million gal., Triple Expansion, Holly Mfg. Co., Buffalo, N. Y.
2. Description of Fuel Used—
   a. Kind, bituminous, run of mine.
   b. Brand, Meadowbrook.

c. Average price of coal per gross ton delivered f. o. b. boat, Water Works dock......................$2.33

d. Percentage of ash, 8.1.

e. Wood, price per cord, none.

3. Coal consumed for the year, 46,412,876 lbs.

4. (Pounds of wood consumed) ÷ 3=equivalent amount of coal. No record. None used except small quantity for starting fires.

4a. Amount of other fuel used, none.

5. Total equivalent of coal consumed for the year=(3) + (4), 46,412,876 lbs.

6. Total Pumping for the Year—

High .... 8,614,094,000 gallons
Low ....30,120,788,890 gallons

Total ....38,734,882,890 gallons, with an allowance of 1% for slip for three compound and one triple expansion engine, and no allowance for slip for three triple expansion engines.

7. Average static head against which pumps work. Direct pressure. No reservoir.

8. Average dynamic head against which pumps work—

High ....70.94 lbs., 163.9 ft.
Low ....53.96 lbs., 124.6 ft.
Whole system ....60.50 lbs., 139.7 ft.

9. Number of gallons pumped per pound of equivalent coal (5), 835.

10. $$\text{Duty}=\frac{\text{Gals. pumped (6) x 8.34 (lbs.) x 100 x dynamic head (8)}}{\text{Total Fuel Consumed (3)}}=97{,}323{,}984$$

Cost of pumping, figured on pumping station expenses, $103,757.49.

11. Cost per million gallons pumped, $2.68.

12. Per million gallons raised one foot (dynamic), $ .0109.

FINANCIAL STATISTICS.

Receipts.

	Balance brought forward		$ 28,353.89
(a)	From ordinary (Maintenance) receipts		1,238,362.53
(b)	From extraordinary receipts (bonds, etc.)		135,000.00
	Total		$1,401,716.42
	From Water Rates—		
A.	Fixture rates	$ 585,359.41	
B.	Meter rates	429,116.78	
C.	Total from consumers		$1,014,476.19
K.	From tax levy		71,753.20
L.	From bond issue and loan		135,000.00
M.	From other sources		152,133.14
N.	Total		$1,373,362.53
	Balance brought forward		28,353.89
	Total		$1,401,716.42

EXPENDITURES.

	Water Works Maintenance—		
AA.	Operation (management and repairs)	$234,518.96	
CC.	Total maintenance		$ 234,518.96
DD.	Interest on bonds		43,455.00
	Interest on loan, Sinking Fund		855.42
EE.	Payment of bonds, bonds purchased and loans paid		83,000.00
	Water Works Construction—		
GG.	Extension of mains	$643,576.71	
II.	Extension of meters	24,365.08	
JJ.	Special (Pumping Works)	329,048.35	
KK.	Total construction		$ 996,990.14
LL.	Unclassified expenses		938.54
	Miscellaneous (Hurlbut Fund)		4,480.31
	Total		$1,364,238.37
	Total balance		37,478.05
N.	Total		$1,401,716.42

Disposition of balance on hand—

Cash	$ 6,334.70
General Fund	24,703.31
Sinking Fund	4,940.40
Hurlbut Fund	499.64
Secretary Fund	1,000.00
Total	$37,478.05

O.	Net cost of works to date	$12,110,607.59
P.	Bonded debt at date	1,207,000.00
Q.	Value of Sinking Fund at date, including bonds, etc.	24,940.40
R.	Average rate of interest	3½+%

STATISTICS OF CONSUMPTION OF WATER.

1.	Estimated total population at date (City of Detroit)	536,139
2.	Estimated population supplied	566,383
3.	Total consumption for the year	38,734,882,890 gallons
4.	Passed through meters	14,405,310,700 gallons
5.	Percentage of consumption metered	37.2
6.	Average daily consumption	105,833,013 gallons
7.	Gallons per day to each consumer	186.6
8.	Gallons per day to each tap	1022
9.	Cost of supplying water, per million gallons, figured on total maintenance (item CC)	$6.05
10.	Total cost of supplying water, per million gallons, figured on total maintenance + interest on bonds	$7.17

STATISTICS RELATING TO DISTRIBUTION SYSTEM.

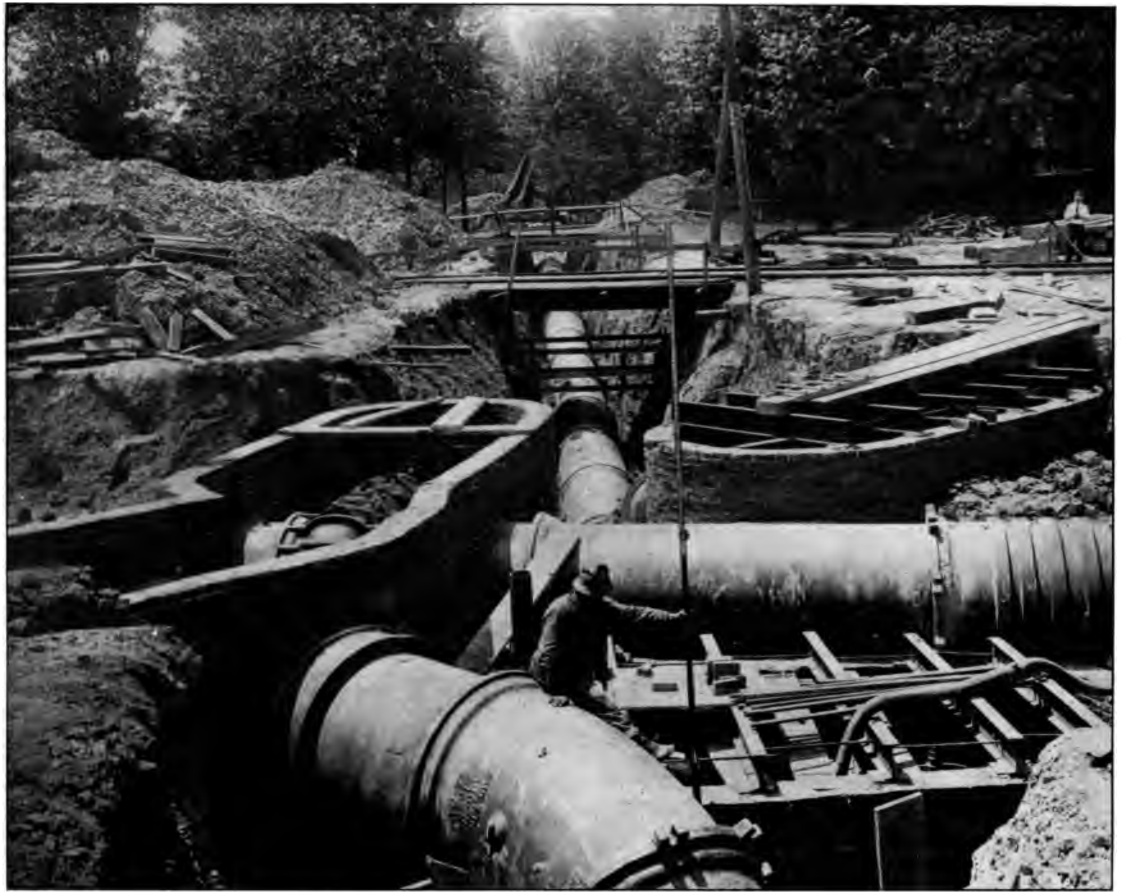
Mains.

1. Kind pipe, cast iron.
2. Sizes, from 2-inch to 48-inch.
3. Extended 240,462 feet during the year.
4. Discontinued 24,468 feet.
5. Total now in use, 840.4 miles.
6. Cost of repairs per mile, $8.99.
7. Number of leaks per mile, 0.152.
8. Length of pipe less than 4 inches in diameter, 10.9 miles.
9. Number of hydrants (public) added during year, 255.

10. Number of hydrants (public) now in use, 5,849; cisterns, 532.
11. Number of stop gates added during year, 294.
12. Number of stop gates now in use, 8,890.
13. Number of blow-offs, 973.
14. Number of stop gates smaller than 4-inch, 20.
15. Range of pressure on mains, 9 lbs. to 100 lbs., (Extremes from hourly readings at pressure gauges.)

Services.

16. Kind of pipe, mostly lead and cast iron, some galvanized iron.
17. Sizes, ⅝-inch to 12-inch.
18. Number of meters added, 1,059.
19. Number now in use, 10,807.
20. Percentage of services metered (City of Detroit), 11%.
21. Percentage of receipts from metered water (B + C), 42.2%.
22. Number of motors and elevators added, 17 elevators. No record of motors.
23. Number now in use, 59 elevators.



48-Inch Pipe Connection in Front of New Pumping Station, May 3, 1912.

REPORT OF CHIEF ENGINEER.

DETROIT, MICH, JULY 1, 1912.

To the Honorable The Board of Water Commissioners of the City of Detroit.

GENTLEMEN:—I have the honor to submit the Engineer's report for the year ending June 29, 1912.

The cost of fuel per million gallons pumped was $1.50, and per million gallons pumped 100 ft. high was $1.09. The amount of water pumped during the year was 38,734,882,890 gallons, making the daily average 105,833,013, which is an increase of 14.8 per cent compared with the preceding year.

The total expense during the year for pumping water including maintenance, heating station, library and greenhouse, hoisting coal, etc., was $103,757.49, thus making the cost per million pumped $2.68, which is a decrease of 13% from preceding year.

The station duty of coal consumed for all purposes for the year was 96,252,943 foot pounds.

Respectfully submitted,

HARRY W. GOULD,

Chief Eng. Pumping Station.

Roll of Commissioners and Their Tenure of Office.

James A. Van Dyke	1853	1855	Died.
Edmund A. Brush	1853	1868	Resigned.
Henry Ledyard	1853	1859	Resigned.
Shubuel Conant	1853	1859	May 1st.
William R. Noyes	1853	1865	Resigned.
Alexander D. Frazer	1855	1871	May 1st.
Julius D. Morton	1859	1865	Died.
John V. Ruehle	1859	1861	Resigned.
Chauncy Hurlbut	1861—1863	1868—1885	Died.
Stanley G. Wight	1863	1868	May 1st.
Jacob S. Farrand	1865	1890	May 1st.
John Owen	1865	1879	May 1st.
Caleb Van Husan	1868	1872	May 1st.
Samuel F. Hodge	1871	1879	Resigned.
Elija Smith	1872	1877	May 1st.
Michael Martz	1877	1887	May 1st.
James Beatty	1879	1885	Died.
John Pridgeon	1879—1884	1886—1891	May 1st.
Marshall H. Godfrey	1884	1889	Resigned.
Edwin F. Conley	1885	1886	May 1st.
Samuel G. Caskey	1885	1895	May 1st.
Joseph Nagel	1887	1890	Died.
August Goebel	1889—1894	1897—1898	Resigned.
Henry M. Duffield	1890	1895	May 1st.
Joseph L. Hudson	1890	1894	May 1st.
Frank E. Kirby	1891	1896	May 1st.
Albert L. Stephens	1894	1897	May 1st.
D. W. H. Moreland	1894	1896	Resigned.
Clarence A. Black	1894	1894	Resigned.
Edward W Pendleton	1894	1909	May 1st.
Darius D Thorp	1895	1905	May 1st.
John P. Huckestein	1896	1897	Resigned.
John W. McGrath	1896	1901	May 1st.
Joseph J. Noeker	1898	1902	May 1st.
James W. Millen	1897	1898	May 1st.
James Meathe	1898	1899	Died.
Benjamin Guiney	1899	1900	Resigned.
John Zynda	1900	1908	May 1st.
Joseph J. Crowley	1901	1906	May 1st.
John Schroeder	1902	1907	May 1st.
John F. Dodge	1905	1910	May 1st.
Frederick J. Clippert	1906	1911	May 1st.
James H. Pound	1907	1912	Resigned.

MEMBERS OF THE BOARD 1911-1912.

Basil A. Lemkie
James Wilkie
John Gillespie
George Lane
James H. Pound, Resigned
James J. Brady

The SIXTY-FIRST ANNUAL REPORT of the Board of Water Commissioners of the City of Detroit

For the Year Ending
June 30th, 1913

President, James Wilkie

SIXTY-FIRST ANNUAL REPORT

OF THE

Board of Water Commissioners

OF THE CITY OF DETROIT

TO THE

COMMON COUNCIL OF THE CITY OF DETROIT

Together with the Reports of the Officers
of the Board

FOR YEAR ENDING JUNE 30, 1913

DETROIT, MICH.
THOS. SMITH PRESS
1913

CONTENTS

Page

Report of the Commissioners 9

Financial Report of the Secretary 11

Report of the Civil Engineer 22

Summary of Statistics 35

Report of the Chief Engineer at Pumping Works 40

Roll of Commissioners... 41

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BOARD OF WATER COMMISSIONERS
OF THE
CITY OF DETROIT

MEMBERS

JAMES WILKIE, 1914 EMIL STROH, 1915
GEORGE LANE, 1916 JAMES J. BRADY, 1917
THOMAS F. COMERFORD, 1918

COMMITTEES

Ways and Means	Commissioners COMERFORD and BRADY
Extension and Construction	Commissioners LANE and COMERFORD
Pumping Station	Commissioners BRADY and STROH
Supplies	Commissioners STROH and LANE

The President is ex-officio member of each Committee.

OFFICERS

President	JAMES WILKIE
Vice President	EMIL STROH
Secretary and Purchasing Agent	H. S. STARKEY
Civil Engineer	GEORGE H. FENKEL
Auditor and Paymaster	J. W. LOEFFLER
Chief Engineer at Pumping Works	HARRY W. GOULD
Bookkeeper	GEORGE BARRIE
Cashier	CHARLES W. KEENA
Meter Clerk	CHAS. F. GILMER
Permit Clerk	C. GESSLEY
Chief Clerk, Rate Department	WALTER C. BOWEN

THE BOARD OF WATER COMMISSIONERS

OF THE

CITY OF DETROIT

Rates Adopted June 15th, 1909

FROM JULY 1ST, 1909

Payable Quarterly	Quartely
First 30,000 gallons	$1 75
All in excess of 30,000 gallons	3 cts. per M.
Minimum rate	1 75

ASSESSMENT RATES

	Per Annum
For Family, household purposes, each family	$3 20
Stores and Offices, from	$1 00 to $12 00
Boarding Houses, in addition to family rate, each boarder or roomer	40
Estimated quantities of water, each 1,000 gallons	07
Building Purposes, each 1,000 brick	03
“ “ each 100 yards plastering	05
“ “ each perch stone	01
“ “ minimum	50
Automobiles, each	1 20

FIXTURES

Bath Tub, for families, each	1 00
“ public, each tub	4 00
Automatic Water Closets, for family, 1st closet	1 60
“ “ “ each, additional	60
Rod Water Closets, not less than	6 00
Urinals, not less than	2 00
Wash Hand Basin, for family, each	50
“ “ “ for other purposes, each person	15
Hose Bibb or connection, Premises 30 feet front or less	1 00
“ “ “ “ 30 feet to 60 feet	1 40
“ “ “ “ 60 feet to 100 feet	2 00

Special rates for larger grounds.

Fountains	$10 00 to 20 00
Street Sprinklers, each wagon	50 00

Where there is a waste of water an increase of rates will be made.

ANNUAL REPORT
OF THE
BOARD OF WATER COMMISSIONERS
OF THE
CITY OF DETROIT

JULY 1, 1912 TO JUNE 30, 1913

TO THE HONORABLE

The Common Council of the City of Detroit.

GENTLEMEN:—The Board of Water Commissioners of the City of Detroit respectfully presents its annual report for the fiscal year ending June 30th, 1913.

The total income of the Board was $1,736,113.97, and the total expenditures were $1,694,147.19. Of the receipts $306,145.19 was from bonds and loans and the balance from ordinary receipts.

Of the expenditures $1,318,031.71 was for constructions, $262,632.27 was for maintenance, $49,278.36 for the payment of interest on bonds and loans, and $50,000.00 to pay loans and purchase of bonds.

The average consumption for each person supplied, was 174 gallons during the fiscal year, while it was 187 gallons during the year ending June 30th, 1912. The decrease in the quantity used by each consumer was due largely to the increase in the number of meters in use.

Beginning Sept. 15th, all new buildings must be provided with meters, and as soon as the Board can arrange to supply the meters, all water used in the city will be metered, and by this it is expected that the pumpage per capita will be reduced to about 110 gallons per day.

One new engine is nearly ready for use, and two others will be ready for service early in the year 1914. When the three engines are added to the service, the pumping capacity will be increased 50 per cent.

The purity of the water supply at the present time is unquestioned, but in the spring of the year, the water is not as pure as may be desired. With a view to supplying pure water throughout the year, plans for a filteration plant are under consideration.

Until the validity of the Verdier Act is decided by the Supreme Court, this Board cannot issue the $2,000,000 in bonds authorized in April this year, so has been unable to provide funds necessary for the extension of large mains.

When the money is available, the Board will rush the work of laying mains to the extent the growth of the City demands.

Respectfully submitted,

JAMES WILKIE,
EMIL STROH,
GEORGE LANE,
JAMES J. BRADY,
THOMAS F. COMERFORD,
Commissioners.

REPORT OF THE SECRETARY

To the Honorable the Board of Water Commissioners of the City of Detroit.

GENTLEMEN:—I respectfully submit the report of the Secretary's office for the year ending June 30th, 1913:

RECEIPTS.

Water rates, assessed	$650,889.81
Water rates, metered	494,579.48
Hydrant rental	300.00
Percentage	8,815.85
Shutting-off and letting-on	292.66
Service connections	359.38
Service cocks, permits	28,827.79
Plumbers' license	751.00
City of Detroit	78,246.80
Real estate, revenue and expense	2,408.10
Meter repairs	682.67
New pumping station	9.92
Repairing leaks	115.21
Horse, wagon and harness account	649.37
Bonuses	6,280.49
Iron pipe, material and labor	47,583.84
M. E. Wilson	1,615.00
Village of Hamtramck	12,357.00
Village of St. Clair Heights	3,671.00
Village of Highland Park	29,871.00
Village of Ecorse	12,183.00
Grosse Pointe Parks	362.00
August Jax	394.00
Holden & Murray	497.56
Bessinger & Moore	9,666.00
F. W. Ward	646.00

D. W. Ward	41.00	
Palmer Park Realty Co	3,554.00	
Gray Estate Co	619.00	
Cook Farm Co	170.00	
J. D. & F. B. Wallace	642.00	
Ward & Logan	534.00	
A. C. Dietsche	2,001.00	
Alex. Girardin	479.00	
City & Suburban Homes Co	286.35	
H. B. Stratton	478.00	
Lambrecht, Kelley & Co	13,572.00	
Meter account	2,500.43	
Service extensions	46.92	
Interest on Hurlbut Fund	55.81	
Interest on Sinking Fund	2,383.90	
Interest on General Fund	3,020.00	
Office	3.95	
Pumping water account	28.35	
Loan account	75,000.00	
Interest Fund, accrued interest on Bonds sold	1,145.19	
Hurlbut Fund	4,736.93	
Real estate account	2,709.21	
Bonded indebtedness account	230,000.00	
Engineering account	2.00	
Inspection	50.00	
Total		$ 1,736,113.97

DISBURSEMENTS.

Office (Operation)—		
Pay rolls	$ 36,243.96	
Books, stationery and printing	2,078.14	
Advertising and subscription	740.03	
Postage	1,918.00	
Telephone rental	274.81	
Surety bonds	139.51	
Miscellaneous	1,489.59	
Total		$ 42,884.04

Inspection (Operation)—

Pay rolls	$ 14,249.65	
Car tickets	605.00	
Miscellaneous	292.17	
Total		$ 15,146.82

Pumping Water (Operation)—

Pay rolls	$ 51,861.82	
Coal	59,642.69	
Unloading coal	5,839.36	
Boiler and engine supplies and repairs	3,530.97	
Oil and waste	1,399.59	
Tools and repairs	217.69	
Miscellaneous	1,591.25	
Total		$ 124,083.37

Real Estate, Revenue and Expense—

W. E. Ballman, on contract	$ 3,867.00	
Jno. D. Templeton Co., on contract	465.00	
Trombley Electric Co., electric wiring (office)	320.00	
Robt. Hutton & Co., repairing roofs	196.60	
Fire insurance	236.60	
American Blower Co., Ventura fan and motor	148.00	
Miscellaneous	431.18	
Total		$ 5,664.38

Horse Expense (Construction)—

Oats, hay and bedding	$ 4,771.05	
Shoeing	301.66	
Veterinary and drugs	205.09	
Barnmen	3,402.00	
Miscellaneous	271.63	
Total		$ 8,951.43

Horses, Wagon and Harness—

Horses	$ 4,050.76	
Wagon painting and repairs	1,733.56	
Harness and repairs	212.65	
Total		$ 5,996.97

Meter Repair and Expense—

Material and labor	$ 9,944.21	
Total		$ 9,944.21

Repairing Leaks—		
Material and labor	$ 18,228.49	
Total		$ 18,228.49
Gladwin Park (Operation)—		
Pay rolls	$ 8,107.13	
Seed, pots and sod	288.14	
Miscellaneous	567.84	
Total		$ 8,963.11
Iron Pipe (Construction)—		
Pay rolls	$392,238.47	
Iron pipe	250,842.21	
Special castings	27,442.87	
Gates, valves and hydrants	31,282.11	
Lead, lead pipe, cement and stone	25,422.77	
Sand, brick, cement and stone	17,211.14	
Lumber and hardware	9,726.06	
Coal	1,885.48	
Tools, repairs	4,303.35	
Lanterns and globes	175.35	
Iron beams and rails	1,556.53	
Car tickets	413.50	
Telephone rental	243.32	
Books, stationery and printing	1,004.18	
Hose and couplings	207.81	
Inspection and repaving	6,706.75	
Rubber boots and repairs	206.92	
Packing, waste and rope	3,474.01	
Freight and express	3,343.19	
Medical and hospital service	1,416.00	
Protecting railroad tracks	1,119.61	
Drinking fountains and fixtures	158.76	
Refunds on estimates for laying pipe	5,998.70	
Automobiles	6,450.00	
Automobile supplies	10,637.44	
Team hire	24,846.69	
Trench pump and concrete mixer	1,056.20	
Geo. Lockerbie, contract submerged pipe under River Rouge	1,099.00	
Miscellaneous	8,045.83	
Total		$ 838.306.20

Pumping Works (New Addition) and Boiler House—		
Pay rolls	$ 47,828.61	
Bethlehem Steel Co., on contract	70,031.29	
F. H. Goddard, Inc., on contract	78,176.45	
Smith, Hinchman & Grylls, architects est.	3,039.23	
Johnson, Larsen Co., on contract	522.00	
T. B. Rayl Co., on contract	1,100.00	
Harrigan & Reid, on contract	200.00	
Russel Wheel & Foundry Co., on contract	2,000.00	
C. J. Netting Co., on contract	3,000.00	
City of Detroit, Public Lighting Commission	1,815.35	
Northern Engineering Works, on contract	2,287.00	
Seidler Miner Electric Co., on contract	2,300.00	
Wisconsin Bridge & Iron Works, on contract	1,000.00	
Wickes Boiler Works, on contract	5,362.00	
Miscellaneous	4,469.03	
Total		$ 223,130.96
Old Pumping Station (Construction)—		
Holly Manufacturing Co., on engine contract	$ 30,648.74	
American Gas Accumulator Co., lights for crib	931.00	
Precision Instrument Co., combustion recorder	265.00	
Miscellaneous	109.90	
Total		$ 31,954.64
Meters (Construction)—		
Pay rolls	$ 5,377.20	
Meters	27,213.87	
Special castings and fittings	305.87	
Miscellaneous	165.72	
Total		$ 33,062.66
Engineering Department (Construction)—		
Pay rolls	$ 25,110.96	
Printing, stationery and supplies	859.77	
Instruments and tools	551.71	
Street car tickets	205.00	
Miscellaneous	762.99	
Total		$ 27,498.27
Service Connection (Construction)—		
Pay rolls	$ 23,778.29	
Service cocks, sleeves, valves, pipe and fittings	12,552.26	

Miscellaneous	48.46	
Total		$ 36,436.76
Office Furniture and Fixtures—		
Addressograph and graphotype	$ 2,822.74	
Filing cabinets	1,304.49	
Cash registers	855.00	
Wales adding machine	291.00	
Office desks and bookcase	104.75	
Typewriter	81.00	
Miscellaneous	264.68	
Total		$ 5,723.66
Real Estate—		
Lorman & Miner properties	$153,942.31	
Appraisal: Lorman & Miner properties	518.00	
Recording deed	2.12	
Total		$ 154,462.43
Hurlbut Fund—		
Pay rolls	$ 4,044.85	
Carpet, Hurlbut Library	374.50	
Miscellaneous	3.00	
Total		$ 4,422.35
Interest—		
General Fund	$ 1,310.86	
Sinking Fund	47,967.50	
Total		$ 49,278.36
General Fund, Loan Account—		
First National Bank	$ 50,000.00	
Total		$ 50,000.00
Water Rates—		
Refund	$ 8.08	
Total		$ 8.08

RECAPITULATION OF EXPENDITURES FOR OPERATION, AND MAINTENANCE, CONSTRUCTION AND INDEPENDENT.

For Operation and Maintenance—		
Office	$ 42,884.04	
Inspection	15,146.82	
Pumping water	124,083.37	
Gladwin Park	8,963.11	
Meter repairs and expense	9,944.21	
Service connections and repairing leaks, horse expense	4,475.71	
Iron pipe account	28,546.10	
Horse, wagon and harness account	1,946.21	
Real estate, revenue and expense	5,664.38	
Repairing leaks	18,228.49	
Engineering account, 10%	2,749.83	
Total		$ 262,632.27
For Construction—		
Iron pipe	$809,760.10	
Iron pipe, horse expense	4,475.72	
Pumping works (new addition) and boiler house	223,130.96	
Pumping works (old)	31,954.64	
Meters	33,062.66	
Service connections	36,436.76	
Engineering account, 90%	24,748.44	
Total		$ 1,163,569.28
Independent—		
Real estate	$154,462.43	
Loan, General Fund	50,000.00	
Interest	49,278.36	
Office furniture and fixtures	5,723.66	
Horses, wagons and harness account	4,050.76	
Hurlbut Fund	4,422.35	
Water rates, refund	8.08	
Total		$ 267,945.64

RECAPITULATION OF EXPENDITURES.

Total Operation and Maintenance	$ 262,632.27	
Total Construction and Works	1,163.569.28	
Total Independent	267,945.64	
Total		$ 1,694.147.19

CASH STATEMENT FOR THE YEAR ENDING JUNE 30, 1913.

		DR.	
Cash on hand, July 1, 1912		$ 6,334.70	
Cash in Bank—			
General Fund	$ 24,703.31		
Sinking Fund	4,940.40		
Hurlbut Fund	499.64		
Secretary Fund	1,000.00		
		$ 37,478.05	
Total receipts		$1,736,113.97	
			$ 1,773,592.02
		CR.	
Cash on hand, June 30, 1913		$ 10,183.83	
Cash in Bank—			
General Fund	$ 32,836.54		
Less outstanding checks	3,049.17		
		$ 29,787.37	
Sinking Fund		37,603.60	
Hurlbut Fund		870.03	
Secretary Fund	$ 906.68		
Cash on hand	93.32		
		1,000.00	
		$ 79,444.83	
Total disbursements		$1,694,147.19	
			$ 1,773,592.02

THE FIRST NATIONAL BANK.

Detroit, Mich., Aug. 25, 1913.

Board of Water Commissioners, Detroit, Mich.

GENTLEMEN:—This is to certify that the balance standing to the credit of your several accounts at the close of business June 30th, are as follows:

Regular Account	$32,836.54
Secretary Fund	906.68
Hurlbut Fund	870.03
Sinking Fund	37,603.60

Respectfully yours,

IRVING H. BAKER,
Auditor.

FINANCIAL STATISTICS.

Receipts.

Balance brought forward		$ 37,478.05
(a) From ordinary receipts		1,429.968.78
(b) From extraordinary receipts (bonds, etc.)		306,145.19
Total		$ 1,773,592.02
From Water Rates—		
A. Fixture rates	$651,189.81	
B. Meter rates	494,579.48	
		$ 1,145,769.29
C. From tax levy		78,246.80
D. From bond issue and loan		306,145.19
E. From other sources		205,952.69
F. Total		$ 1,736,113.97
Balance brought forward		37,478.05
Total		$ 1,773,592.02

EXPENDITURES.

Water Works Maintenance—	
AA. Operation, management and repairs	$ 262,632.27
BB. Interest on bonds	47,967.50
Interest on loan and accrued interest on bonds	1,310.86
CC. Bonds purchased and loans paid	50,000.00
Water Works Construction—	
DD. Extension of mains	838,984.26
EE. Extension of meters	33,062.66
FF. Extension of service connections	36,436.76
G. Special (Pumping Works)	409,548.03
H. Miscellaneous (Hurlbut Fund)	4,422.35
I. Unclassified expenses	9,782.50
J. Balances	79,444.83
Total	$ 1,773,592.02
K. Net cost of works to date	$12,637,344.80
L. Bonded debt to date	1,437,000.00
M. Value of Sinking Fund at date	57,603.60
N. Average rate of interest	3½% plus

BONDED INDEBTEDNESS.

The following table shows the dates of issue and amount of bonds of this department outstanding at this date. The total amount issued by the Board during its existence is $3,480,000, of which $300,000 were refunded and $1,743,000 redeemed, leaving a balance due of $1,437,00.

No. of Issue 7th	Act of	Issued	Payable	Amount	Rate of Int.	Redeemed or Refnd.	Out-standing
Refnd.	1873	Jan. 10, 1895	Jan. 10, 1925	$ 100,000	4%		$ 100,000
	1869	Feb. 1, 1900	Feb. 1, 1930	200,000	3½%	$ 20,000	180,000
	1873	Jan. 1, 1903	Jan. 1, 1933	50,000	3½%		50,000
	1873	Sept. 1, 1903	Sept. 1, 1933	150,000	3½%		150,000
	1901	June 1, 1904	June 1, 1934	200,000	3½%		200,000
	1901	Aug. 1, 1904	Aug. 1, 1919	100,000	4%		100,000
	1901	Feb. 1, 1905	Feb. 1, 1935	150,000	3½%		150,000
	1901	Aug. 1, 1908	Aug. 1, 1938	250,000	3½%	75,000	175,000
	1901	July 1, 1909	July 1, 1939	200,000	3½%	98,000	102,000
	1901	Oct. 1, 1912	Oct. 1, 1932	230,000	4%		230,000
				$1,630,000		$193,000	$1,437,000

Respectfully submitted,

H. S. STARKEY,
Secretary.

REPORT OF THE CIVIL ENGINEER

Detroit, Michigan, July 1, 1913.

To the Board of Water Commissioners of the City of Detroit, Michigan.

GENTLEMEN:—Your Civil Engineer hereby respectfully submits a brief report of the work done by and under his direction, for the year ending June 30, 1913:

POPULATION.

The total number of families within the city limits, as determined by the June census of the Board, was 124,544, and at the rate of 4.56 persons per family, as explained in the annual report for the year ending June 30, 1911, the estimated population is 567,920. This count includes 154 families not supplied with water, and does not include 931 families living just outside of the City, but not included in the enumeration of the Villages. The estimated number of persons supplied with water in Detroit is 571,372, and as there are 106,878 taps in the City, there are 5.34 persons per tap. As the estimated population June 30, 1912, was 536,139, there has been an increase of 31,781, or 5.93 per cent during the past twelve months. The increase in population during the two years since June 30, 1911, has been 13.9 per cent.

The following table furnishes a comparison of figures for the past five years:

Consumption of Water in Gallons for Past Five Years

Year	Average Daily Per Capita	Average Daily	Per Cent Increase Over Previous Year	Daily Rate at Maximum Hour
1909	167.5	76,210,276	3.8	132,201,120
1910	174.7	85,260,322	12.1	146,320,320
1911	177.3	92,260,322	8.0	161,937,360
1912	186.6	105,833,013	14.7	168,346,080
1913	174.5	105,589,104	-6.5	184,662,480

The decided decrease during 1912-13 over the preceding year is partly due to the mild weather of the past year, as compared with the extreme cold of the previous winter and the unusual heat during the summer of 1911. Weather conditions for the past year are shown in the following table:

Weather Conditions During 1912 and 1913

	July	Aug.	Jan.	Feb.	Mar.	June
Average Normal Temperature	72.0	69.9	24.3	25.0	32.9	67.8
Average 1912 and 1913	71.2	67.4	30.3	21.4	33.7	69.0
Date Maximum	14	31	17	19	14	16
Date Minimum	19	16	13	5	7	8
Maximum Temperature	87	90	54	58	68	95
Minimum Temperature	50	51	12	—2	+2	39
Normal Precipitation	3.48	2.77	1.98	2.19	2.37	3.89
Precipitation	3.87	4.05	3.95	1.24	5.63	1.42

In the following table, which shows the amount of water used in Detroit and the surrounding Villages, the quantities used in the Village of St. Clair Heights and in the Township of Hamtramck are included with the unmetered water for Detroit.

Consumption of Water in Detroit and Villages

Corporation	U. S. Gallons Supplied July 1, 1912, to June 30, 1913, inclusive		Estimated No. of Persons Supplied	Gallons per Capita Daily	No. of Taps
	Total	Daily Avg.			
Detroit, unmetered	23,656,249,902	64,811,644	571,372	179.2	106,878
Detroit, metered	13,724,145,100	37,600,397			
Highland Park, metered	593,068,250	1,624,844	16,068	101.1	3,009
River Rouge, metered	134,655,700	368,919	5,724	64.4	1,072
Ecorse, metered	30,264,080	82,915	1,612	51.4	302
Hamtramck, metered	353,023,100	967,188	8,795	109.9	1,647
Oakwood, metered	29,818,040	81,693	609	134.1	114
Grosse Pointe, metered	11,550,600	31,645	401	78.9	75
Greenfield, metered	7,248,100	19,859	325	61.1	30
Total	38,540,022,872	105,589,104	604,906	174.5	113,127

The general statistics regarding the total consumption are as follows:

Maximum Day, June 16, 1913	142,665,410 gals.
Minimum Day, April 27, 1913	85,893,550 gals.
Average Daily, (Entire System)	105,589,104 gals.
Average Daily, (High Service)	26,543,819 gals.
Average Daily, (Low Service)	79,045,285 gals.
Total for Year	38,540,022,872 gals.
Maximum Hour (Entire System) June 16, 1913, 6 to 7 p. m.	7,694,270 gals.
Minimum Hour (Entire System) Oct. 30, 1912, 1 to 2 a. m.	2,414,920 gals.
Maximum Hour (High Service) June 16, 1913, 6 to 7 p. m.	2,398,000 gals.
Maximum Hour (Low Service) June 16, 1913, 6 to 7 p. m.	5,296,270 gals.
Rate Per Day at Maximum Hour (Entire System)	184,662,480 gals.
Rate Per Day at Minimum Hour (Entire System)	57,958,080 gals.

Of the total amount of water used during the year, 28,454,544 gallons, or less than 1-10 of 1 per cent, were used by the Fire Department at 697 fires.

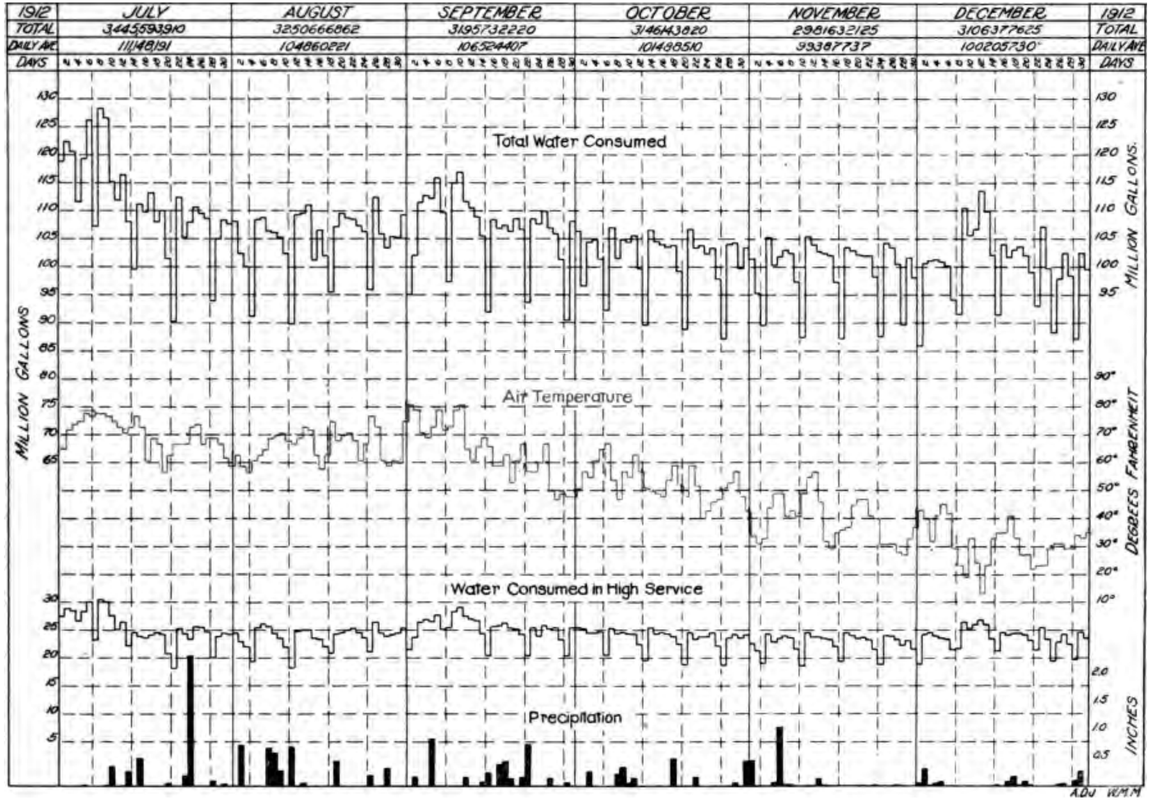
WATER PRESSURE.

A glance at the table of pressures will show that there has again been a decided decrease in average pressures over the

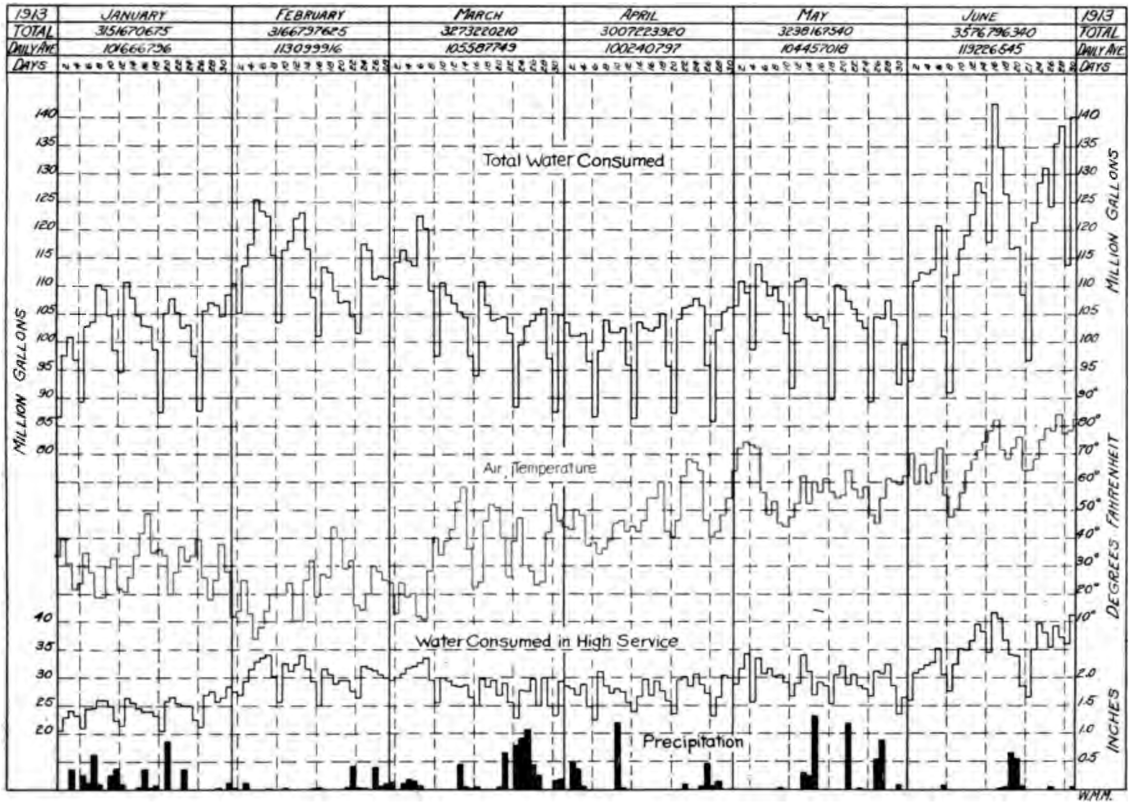
Table of Pressures.

	LOCATION OF GAUGES	Elevat'n above City Datum	Elevat'n above surface pump wells (92.0) at which engine guages are set	July 1, 1911 to June 30, 1912. Average Daily Consumption 105,833,013 gallons Total Consumption for Year 38,734,882,890 gallons				July 1, 1912 to June 30, 1913 Average Daily Consumption 105,589,104 gallons Total Consumption for Year 38,540,022,872 gallons				Increase or Decrease in Friction During last Year		Maximum Hour observed June 16, 1913, 7,694,270 gals. 6 to 7 p. m. Daily Rate 184,662,480 gals.		Minimum Hour observed Oct. 30, 1912 2,414,920 gals. 1 to 2 a. m. Daily Rate 57,858,080 gals.	
				Pressures, Pounds			Fric. Loss Lbs.	Pressures, Pounds			Fric. Loss Lbs.	Pounds		Average Pressure Lbs.	Fric. Loss Lbs.	Average Pressure Lbs.	Fric. Loss Lbs.
		Feet	Pounds	High	Low	Mean		High	Low	Mean		Inc.	Dec.				
Low Service	Pumping Station	92.000	....	63	42	53.96	....	59	16	48.89	....	......	......	49.20	....	45.00	....
	Engine No. 32, Vanda and Jefferson	103.419	4.95	56	38	47.26	1.75	50	32	42.35	1.64	......	11	34.00	10.25	41.00	......
	Engine No. 26, Crane and Brinkert	125.787	14.62	44	26	36.38	2.96	39	27	32.68	1.59	......	1.37	30.00	4.58	30.00	.38
	Engine No. 7, Concord, near Jefferson	124.773	14.19	43	28	35.84	3.93	39	27	33.08	1.62	......	2.31	30.50	4.51	31.00	....
	Engine No. 19, Congress, near Jos. Campau	122.473	13.19	42	24	37.57	3.20	37	20	31.31	4.39	1.19	......	29.00	7.01	30.00	1.81
	Engine No. 2, Hastings, near Congress	120.981	12.55	36	22	29.65	11.76	34	19	28.24	8.10	......	3.66	25.50	11.15	28.00	4.45
	Water Office, Randolph and Jefferson	125.176	14.36	32	20	25.74	13.86	29	16	24.19	10.34	......	3.52	17.00	17.84	25.00	5.64
	Engine No. 3, Griswold and Clifford	123.059	13.44	32	16	27.73	12.79	32	19	26.79	8.66	......	4.13	19.00	16.76	27.50	4.06
	Engine No. 8, Sixth and Baker	122.144	13.05	34	21	27.94	12.97	32	18	27.22	8.62	......	4.35	18.00	18.15	29.00	2.95
	Engine No. 4, Eighteenth, near Howard	116.179	10.47	33	20	27.21	16.28	32	15	26.22	12.20	......	4.08	16.00	22.73	29.00	5.53
	Engine No 10, Sixteenth and Bagg	125.282	14.41	29	11	22.41	17.14	31	11	22.24	12.24	......	4.90	15.50	19.29	25.00	5.59
	Engine No. 15, Hubbard near Fort	114.617	9.79	36	21	28.96	15.21	35	16	28.03	11.07	......	4.14	16.50	22.91	29.50	5.71
	Engine No. 29, Solvay and W. Jefferson	115.052	9.98	35	19	27.76	16.22	33	15	26.65	12.26	......	3.96	15.50	23.72	29.00	6.02
	Truck No. 13, Fort and Lewerenz	115.564	10.20	35	17	26.43	17.33	32	12	25.79	12.90	......	4.43	12.50	26.50	27.50	7.30
	Engine No. 27, Junction and Rogers	113.736	9.41	36	19	28.35	16.20	34	14	27.82	11.66	......	4.54	14.50	25.29	30.50	5.09
	Engine No. 14, Scotten near Michigan	121.368	12.71	33	17	25.97	15.28	36	16	27.57	8.61	......	6.67	27.00	9.49	31.00	1.29
	Engine No. 22, Michigan, near Hammond	119.144	11.75	31	14	22.62	19.59	32	12	21.69	15.45	......	4.14	14.00	23.45	25.00	8.25
	Truck No 10, Sheridan and Mack	140.254	20.89	35	19	27.54	5.53	31	13	24.21	3.79	.....	1.74	19.50	8.81	23.50	.61
	Engine No. 18, Mt. Elliott near Sylvester	146.233	23.48	31	16	24.79	5.69	29	11	23.26	2.15	......	3.54	19.00	6.72	22.00	....
	Engine No. 11, Grandy, near Gratiot	143.211	22.17	33	15	26.59	5.20	29	15	22.55	4.17	.. ..	1.03	20.00	7.03	21.50	1.33
	Engine No. 6, High, near Hastings	142.631	21.92	30	16	23.73	8.31	26	15	21.08	5.89	......	2.42	17.00	10.28	20.50	2.58
	Storage Yard, Orleans and Erskine	150.635	25.38	24	12	18.19	10.39	20	11	15.91	7.60	......	2.79	12.00	11.82	15.00	4.62
	Truck No. 5, Russell and Erskine	147.742	24.13	25	9	19.08	10.75	23	4	16.44	8.32	......	2.43	13.50	11.57	18.00	2.87
	Engine No. 5, Alexandrine, near Cass	148.482	24.45	25	10	17.21	12.30	21	7	15.90	8.54	......	3.76	10.50	14.25	17.50	3.05
	Engine No. 12, Sixteenth and Grand River	141.546	21.45	23	10	16.23	16.28	22	5	15.81	11.63	......	4.65	6.00	21.75	17.00	6.55
	Engine No. 31, Cobb and W. Grand Blvd.	135.115	18.66	25	9	17.42	17.88	25	6	17.15	13.08	......	4.80	6.00	24.54	20.00	6.34
	Engine No. 20, Baldwin and Gratiot	145.368	23.10	34	18	26.08	4.78	29	15	22.73	3.06	......	1.72	15.50	10.60	20.00	1.90
High Service	Pumping Station	92.000	....	95	55	70.94	....	86	45	65.42	....	....	.....	68.25	....	56.75	....
	Engine No. 18, Mt. Elliott, near Sylvester	146.233	23.48	50	30	38.95	8.51	50	21	38.23	3.71	......	4.80	36.50	8.27	33.00	.28
	Engine No. 23, Moran and Boulevard	154.288	26.96	43	23	33.00	10.98	42	23	31.30	7.16	......	3.82	27.50	13.79	26.50	3.29
	Engine No. 28, Riopelle and Milwaukee	155.556	27.52	39	22	29.82	13.60	37	15	28.22	9.68	......	3.92	24.00	16.73	25.00	4.23
	Engine No. 13, Russell and Ferry	157.304	28.27	39	22	28.78	13.89	34	15	27.05	10.10	......	3.79	23.00	16.98	25.00	3.48
	Engine No. 17, Cass and Amsterdam	152.825	26.33	34	15	27.39	17.22	32	7	25.06	14.03	......	3.19	10.50	31.42	25.00	5.42
	Engine No. 21, Lincoln, near Piquette	154.880	27.22	35	13	26.88	16.84	32	7	23.62	14.58		2.26	8.00	33.03	24.50	5.03
	Engine No. 24, Kenilworth, near John R	155.855	27.64	34	11	26.11	17.19	33	11	26.45	11.33	......	5.86	13.00	27.61	25.00	4.11
	Engine No. 12, Sixteenth and Grand River	141.546	21.45	......	......	....	....	35	10	26.09	17.88	......	...	10.50	36.30	29.00	6.30
	Highland Park Engine House	163.825	31.09	......		....	....	27	1	18.41	15.92	......	....	3.00	34.16	20.50	5.16

DAILY WATER CONSUMPTION, AVERAGE TEMPERATURE AND PRECIPITATION



DAILY WATER CONSUMPTION, AVERAGE TEMPERATURE AND PRECIPITATION



entire City, as was the case last year. This is due to the decrease in initial pressures at the Pumping Station on both high and low service pumps. The average pressure on the high service pumps has been 65.42 lbs. this year as against 70.94 lbs last year; and on the low service pumps the average pressure has been 48.89 lbs. this year as against 53.96 lbs. last year. The consumption for the year having remained practically the same, it is but natural to expect the friction loss to decrease materially. The table shows that with one exception the friction loss is smaller this year than last.

The 48 in. line on High Street from Woodward to Grand River was put in service June 16, and reduced the friction between the Pumping Station and Engine Houses Nos. 10, 12 and 14, about five pounds.

DISTRIBUTION SYSTEM.

The net increase in the distribution system has been 36.1 miles. There were laid 40.5 miles of pipe and 4.4 miles were discontinued during the year. The Forest Avenue 48 inch line was completed, 6,344 feet being laid at a total cost of $116,444.00. This line completes the second high pressure main and has carried the system past the point where a single break can cripple the entire north end of Detroit. Other large mains put in service during the year include 5,839 feet of 48 inch pipe in Charlevoix Street, from Garland to Van Dyke, costing $121,732.00; 1,542 feet of 48 inch in Garland from Jefferson to Charlevoix, and in Kercheval from Garland to Bewick, costing $33,533.00; 6,348 feet of 48 inch in High Street from 12th to Woodward, at a cost of $136,552.00;3,370 feet of 42 inch in Holbrook, from St. Aubin to Russell, and in Russell, from Holbrook to Westminster, costing $44,301.00;

and 3,977 feet of 24 inch pipe in Holbrook, from Woodward to Oakland, costing $22,870.00; 1,507 feet of 24 inch in Cass, from High to Bagg, costing $10,448.00. 626 feet of 24 inch were laid at the Fort Street crossing of River Rouge, 225 feet of which were submerged.

The following pipe has been laid for better fire protection:

1,332 feet of 6 inch	$ 2,390.05
8,872 feet of 8 inch	20,465.20
2,995 feet of 12 inch	11,904.12
Total, 13,199 feet	$34,759.37

The total cost of all pipe laying work for the year was $827,349.14, of which approximately 36 per cent was paid for labor. The cost of this work in Detroit and Villages was as follows:

Summary of Amount of Pipe Line in Detroit and Outside Villages July 1st, 1912 to June 30th, 1913

			Cost of Construction		
	Feet	Size	Material, etc.	Labor	Total
City of Detroit	6,363	4"			
	36,378	6"			
	69,916	8"			
	2,046	10"			
	17,274	12"			
	1,146	16"			
	5,732	24"			
	31	36"			
	3,469	42"			
	21,449	48"	$475,018.10	$269,386.34	$744,404.44
Village of Highland Park	8,903	6"			
	12,940	8"			
	438	12"			
	6,855	16"	30,563.34	17,748.61	48,311.95
Village of Hamtramck	2,142	6"			
	3,224	8"			
	351	12"	5,614.74	2,796.79	8,411.53
Township of Hamtramck	759	6"	514.32	318.24	832.56

Summary of Pipe Laid, continued

			Cost of Construction		
	Feet	Size	Material, etc.	Labor	Total
Village of St. Clair Heights.....	2,498	6"			
	1,067	8"	2,261.21	1,359.35	3,620.56
Township of Leesville...........	1,071	6"			
	1,385	8"	1,751.86	1,230.61	2,982.47
Township of Greenfifield.........	3,477	6"			
	2,321	8"			
	661	12"	4,881.97	4,250.53	9,132.50
Village of Oakwood.............	55	16"			
	626	24"	5,162.04	2,375.32	7,537.36
Village of Grosse Pointe Parks...	400	6"			
	1,095	8"	1,505.26	610.51	2,115.77
Total	214,072		$527,272.84	$300,076.30	$827,349.14

The extent of the distribution system is shown in the following table:

Distribution System, June 30th, 1913

Size in Inches	Laid during Year Feet	Percent	Discontinued during Year	Total in System June 30, 1913 Feet	Percent	Total Feet outside Detroit June 30, 1913	No. of Gates in System June 30, 1913	
2				4,624	.0999		3"	27
3			1,804	51,389	.1101		4"	2122
4	6,363	2.972	16,451	782,962	16.2178	33,678	6"	4581
6	55,628	25.986	3,394	2,170,537	46.8999	318,820	8"	1776
8	91,948	42.952	745	741,257	16.0167	132,733	10"	553
10	2,046	.956	829	243,621	5.2670	7,823	12"	417
12	18,724	8.746		192,207	4.1509	13,670	16"	122
16	8,056	3.763		96,061	2.0756	10,202	18"	2
18				87	.0018		20"	11
20				393	.0084		24"	80
24	6,358	2.970		99,180	2.1432	626	30"	43
30				54,629	1.1803		36"	7
36	31	.014		7,979	.1724		42"	75
42	3,469	1.621		116,923	2.5264		48"	39
45				103	.0022			
48	21,449	10.020		66,061	1.4274			
Total.	214,072	100.000	23,223	4,628,013	100.0000	517,552		9855
Miles	40.54		4.39	876.51		98.02		

The following comparison between the average daily pumpage and the cubic contents of the distribution system shows there has been no relative change in these since 1908.

Year ending June 30	Average Daily Pumpage Gallons	Cubic Contents of Distribution System Gallons	Percentage Contents is of Pumpage
1908	73,380,162	17,493,671	23.8%
1909	76,210,276	20,036,629	26.3%
1910	85,411,383	21,343,000	25.0%
1911	92,260,322	23,540,144	25.5%
1912	105,833,013	25,214,748	23.8%
1913	105,589,104	28,160,097	26.6%

In the district between Woodward and Grand River, the location of the line dividing the high and low systems was changed during the past year, the work being completed in August. The area transferred from the low to the high pressure system by this change is approximately one and one-half miles long by one-half mile wide. Pressure gauges within this territory show that pressures were increased about ten pounds.

PUMPING STATION AND GLADWIN PARK.

The contractors on the new Pumping Station have completed brick and stone work and tile roofing. Ornamental iron work has been completed as far as conditions inside of building will permit. A thirty ton electric travelling crane has been erected by the Northern Engineering Works, and erection of the three thirty million gallon pumping engines has been started by the Bethlehem Steel Co.

The Board has set transformers and completed conduits from Jefferson Avenue to the new station. The seven-foot brick conduit supplying water to the new station has been completed and work started on a concrete steam tunnel connecting the two stations, and a 20-inch sewer has been laid from the new station to Jefferson Avenue.

Seven 72-inch hand operated gate valves have been set in the water gallery and six 48-inch hydraulic gate valves have been set on the suction and discharge of the new engines.

In Gladwin Park, three 42-inch Venturi meters have been set in the discharge lines on the low service, and connected with registers in the old station.

On the new boiler house at the old station there has been completed the brick, stone and roofing, and there remains to be finished only the floor, doors and windows. A new brick stack 10 ft. x 150 ft. has been built and four 400 h. p. vertical Wickes water tube boilers with Detroit stokers have been erected.

On April 28, the installation of the flashing light on the tower of the intake crib was completed. The lamp was furnished by the American Gasaccumulator Co., of Philadelphia, and is classed by the government as a "private aid to navigation." Its "characteristic" consists of a brilliant white flash of ¾ of a second duration, a dark period of 3½ seconds, a flash for ¾ of a second, and a dark period of 10 seconds.

The emergency plant for the treatment of water with hypochlorite of lime was rebuilt last fall. No occasion arose for its use during the winter, but following an unusually hard wind on March 21, the water in Lake St. Clair and the river became extremely muddy, and it was thought advisable to begin chemical treatment of the water. Treatment was started at the rate of five pounds of hypo per million gallons, and this amount was increased at intervals until the present rate of nine pounds per million gallons was reached.

In June work was started on preliminary plans and estimates for a filtration plant of 200,000,000 gallons capacity.

STORAGE YARD.

Of the following tables the first shows the nature and cost of the principal items involved in the construction, operation and maintenance of the Yard itself, while the second includes all work done outside of the Yard by the men from the Yard.

Work Done in Storage Yards, 1912-1913

Building manure box and laying concrete pavement	$ 225.51
Finishing loft in office building into offices	1,174.80
Building addition to carpenter shop	529.84
Building temporary shed	506.16
Loading, unloading, checking and storing materials, cleaning and trimming pipe	11,972.50
Cleaning and caring for lanterns, tapping machines and other equipment	1,346.76
Night clerk, watching and care of yards and office	3,164.90
Caring for stables, horses and wagons	3,479.59
Night, Sunday and Holiday emergency	5,898.87
Making and repairing tools	4,086.29
Repairing wagons	202.17
Horseshoeing	597.08
Clerks	9,630.89
	$42,815.42

General Work, 1912-1913

Tapping mains and inserting 2759 1" and 5609 ⅝" cocks for service	$11,196.70
Setting sleeves and valves for service (230)	3,795.54
Public drinking fountains set (11)	735.47
Examining, repairing, cleaning and setting to grade gate wells and boxes	10,636.56
Examining, repairing and greasing gates in the system	10,605.53
Repairing leaks and breaks in mains (121)	5,929.27
Attending to leaks in service connections (573)	2,337.36
Responding to false reports of leaks (188)	415.68
Opening blow-offs to flush dead ends	3,646.19
Shutting service connections on account of non-payment of taxes, leaks, etc., and letting on same	167.46
Examining air chambers for water hammer	225.18
Examining hydraulic elevator connections	4.45
Curing no water and short supply complaints	434.54
Examining private connections and fire plants to prevent contamination	460.26
Repairing sunken trenches over pipe lines	448.74
Caring for drinking fountains	755.01
Attending to lights at intake crib	499.40
Connecting blow-off to sewer at Garland and Jefferson Aves	138.79
Connecting blow-off to sewer at Beaufait N. of Sylvester Ave	186.46
Lowering sprinkler connection at Acme White Lead Works, St. Aubin and Marston Aves.	56.40

General Work, 1912-1913, continued

Making connection for pressure gauge at Engine House No. 12, 15th and A. S. of Warren	127.76
Killing 3", 4" and 6" mains in Porter, Vermont, A. S. of Porter and A. W. of Twelfth	90.41
Material supplied and billed to outside parties	7,144.40
Meters supplied and billed to outside parties	1,793.81
Miscellaneous work done and billed to outside parties	8,430.94
City "pick-up" and miscellaneous cartage	1,494.69
Miscellaneous work done at Gladwin Park	159.85
Miscellaneous work done at Emergency Station	8.28
Miscellaneous work done at Main Office	50.23
Miscellaneous work done at Meter Shop	65.74
Miscellaneous work	653.42
	$72,684.62

METER SHOP.

June 30, 1912, there were 98,468 service connections, of which 10,807 or 11% were metered. June 30, 1913, the service connections numbered 106,878, and the meters in service 13,302 or 12.5%. During the year ending June 30, 1912, 37.2% of all water pumped passed through meters, the receipts from which amounted to 42.2% of all moneys received as water rates, while during the past year 38.6% was metered water, and the income amounted to 43.1% of the total receipts.

The cost of setting, removing, repairing and testing meters during the year ending June 30, 1913, was $12,698.23, and the cost of new meters was $19,385.90, making a total cost of $32,084.13, for all work done and material used by the Meter Department. This is an increase of 47% over the corresponding figure for last year.

Number of Meters Placed from July 1, 1912 to June 30, 1913.

	⅝"	¾"	1"	1½"	2"	3"	4"	6"	8"	Ind.	Total
In service July 1, 1912	5899	1989	1455	539	498	195	138	57	3	34	10,807
Placed during year ending June 30, 1913	2913	823	526	67	101	37	39	25	1	..	4,532
	8812	2812	1981	606	599	232	177	82	4	34	15,339
Removed during year ending June 30, 1913	1179	506	283	21	27	13	6	2	.	..	2,037
Total in service	7633	2306	1698	585	572	219	171	80	4	34	13,302

SUMMARY OF STATISTICS

For the Year Ending June 30, 1913

In form recommended by the New England Water Works Association.

Detroit, Michigan, Water Works,
Detroit, Wayne County, Michigan.

GENERAL STATISTICS.

Population by U. S. Census, 1910, 465,766.

Date of construction, 1827 to date.

By whom owned, The Board of Water Commissioners of the City of Detroit.

Source of supply, Detroit River, near Lake St. Clair.

Mode of supply (whether gravity or pumping) pumping.

PUMPING STATISTICS.

1. Builders of Pumping Machinery—
   - One 24 million gal., Compound Beam, Detroit Locomotive Works, Detroit, Mich.
   - One 24 million gal., Compound Beam, Riverside Engine Works, Detroit, Mich.
   - One 30 million gal., Compound Beam, Riverside Engine Works, Detroit, Mich.
   - One 24 million gal., Triple Expansion, E. P. Allis & Co., Milwaukee, Wis.
   - Two 25 million gal., Triple Expansion, Allis-Chalmers Co., Milwaukee, Wis.
   - One 25 million gal., Triple Expansion, Holly Mfg. Co., Buffalo, N. Y.

2. Description of Fuel Used—
    - a. Kind, bituminous, run of mine.
    - b. Brand, Meadowbrook.
    - c. Average price of coal per gross ton delivered f. o. b. boat, Water Works dock.............................$2.33
    - d. Percentage of ash, 6.5.
    - e. Wood, price per cord, none.
3. Coal consumed for the year, 42,393,168 lbs.
4. (Pounds of wood consumed) ÷(3)=equivalent amount of coal. No record. None used except small quantity for starting fires.

4a. Amount of other fuel used, none.

5. Total equivalent of coal consumed for the year=(3) + (4), 42,393,168 lbs.
6. Total Pumping for the Year—

High Service	9,688,494,264	gallons
Low Service	28,851,628,608	gallons
Total	38,540,022,872	gallons, with an

allowance of 1% for slip for three compound and one triple expansion engine, and no allowance for slip for three triple expansion engines.

7. Average static head against which pumps work. Direct pressure. No reservoir.
8. Average dynamic head against which pumps work—

High Service	65.42 lbs.,	151.0 ft.
Low Service	48.89 lbs.,	112.9 ft.
Whole system	54.91 lbs.,	126.8 ft.

9. Number of gallons pumped per pound of equivalent coal (5), 909.
10. $$\text{Duty} = \frac{\text{Gals. pumped (6)} \times 8.34\ \text{(lbs.)} \times 100 \times \text{dynamic head (8)}}{\text{Total Fuel Consumed (3)}} = 96{,}139{,}473$$

    Cost of pumping figured on pumping station expenses, $112,433.01.
11. Cost per million gallons pumped, $2.92.
12. Per million gallons raised one foot (dynamic), $.011.

FINANCIAL STATISTICS

Receipts

Balance brought forward	$ 37,478.05
(a) From ordinary (Maintenance) receipts	1,429,968.78

(b)	From extraordinary receipts (bonds, etc.)		306,145.19
	Total		$ 1,773,592.02
From Water Rates—			
A.	Fixtures Rates	$651,189.81	
B.	Meter Rates	494,579.48	
C.	Total from consumers		$ 1,145,769.29
K.	From Tax Levy		78,246.80
L.	From bond issue and loan		306,145.19
M.	From other sources		205,952.69
N.	Total		$ 1,736,113.97
	Balance brought forward		37,478.05
	Total		$ 1,773,592.02

EXPENDITURES.

Water Works Maintenance—			
AA.	Operation (management and repairs)	$ 262,632.27	
CC.	Total Maintenance		$ 262,632.27
DD.	Interest on bonds		47,967.50
	Interest on loan and accrued interest on bonds		1,310.86
EE.	Payment on bonds, bonds purchased and loans paid		50.000.00
Water Works Construction—			
GG.	Extension of mains	$838,984.26	
II.	Extension of meters	33,062.66	
JJ.	Special (Pumping Works and extension of service connections)	445,984.79	
KK.	Total Construction		$ 1,318,031.71
LL.	Unclassified expenses		9,782.50
	Miscellaneous (Hurlbut Fund)		4,422.35
	Total		$ 1,694,147.19
	Total Balance		79,444.83
N.	Total		$ 1,773,592.02
Disposition of balance on hand—			
	Cash		$ 10,183.83
	General Fund		29,787.37
	Sinking Fund		37,603.60
	Hurlbut Fund		870.03

	Secretary Fund	1,000.00
	Total	$ 79,444.83
O.	Net Cost of Works to date	$12,637,344.80
P.	Bonded debt at date	1,437,000.00
Q.	Value of Sinking Fund, at date, inc. bonds, etc.	57,603.60
R.	Average rate of interest	3½% plus

STATISTICS OF CONSUMPTION OF WATER.

1.	Estimated total population at date (City of Detroit)	567,920
2.	Estimated population supplied	604,906
3.	Total consumption for the year	38,540,022,872 gallons
4.	Passed through meters	14,883,772,975 gallons
5.	Percentage of consumption metered	38.6
6.	Average daily consumption	105,589,104 gallons
7.	Gallons per day to each consumer	174.5
8.	Gallons per day to each tap	933.0
9.	Cost of supplying water, per million gallons, figured on total maintenance (item CC)	$6.81
10.	Total cost of supplying water, per million gallons, figured on total maintenance + interest on bonds	$8.09

STATISTICS RELATING TO DISTRIBUTION SYSTEM.

Mains.

1. Kind pipe, cast iron.
2. Sizes, from 2-inch to 48-inch.
3. Extended 214,072 feet during the year.
4. Discontinued 23,223 feet.
5. Total now in use, 876.5 miles.
6. Cost repairs per mile, $6.76.
7. Number of leaks per mile, 0.138.
8. Length of pipe less than 4 inches in diameter, 10.6 miles.
9. Number of hydrants (public) added during year, 184.
10. Number of hydrants (public) now in use, 6,033; cisterns, 535.
11. Number of stop gates added during year, 332.
12. Number of stop gates now in use, 9,855.
13. Number of blow-offs, 992.
14. Number of stop gates smaller than 4-inch, 23.

15. Range of pressure on mains, 1 lb. to 86 lbs. (Extremes from hourly readings at pressure gauges.)

Services.

16. Kind of pipe, mostly lead and cast iron, some galvanized iron.
17. Sizes, ⅝-inch to 12-inch.
18. Number of meters added, 2,495.
19. Number now in use, 13,302.
20. Percentage of services metered (City of Detroit), 12.4%.
21. Percentage of receipts from metered water (B ÷ C), 43.1%.

GEO. H. FENKELL,
Civil Engineer.

REPORT OF CHIEF ENGINEER

To the Honorable the Board of Water Commissioners of the City of Detroit.

GENTLEMEN :—I have the honor to submit the Engineer's report for the year ending June 30, 1913.

The cost of fuel per million gallons pumped was $1.40 and per million gallons pumped 100 feet high was $1.10.

The amount of water pumped during the year was 38,540,022,872 gallons, making the daily average 105,589,104 gallons, which is a decrease of 3/10 per cent, compared with the preceding year.

The total expense during the year for pumping water, including maintenance, heating new and old station, library and greenhouse, hoisting coal, etc., was $112,433.01, thus making the cost per million gallons pumped $2.92, which is an increase of 9 per cent from preceding year.

The station duty of coal consumed for all purposes for the year was 96,139,473 foot pounds.

Respectfully submitted,

HARRY W. GOULD,
Chief Engineer Pumping Station.

Roll of Commissioners and Their Tenure of Office

James A. Van Dyke	1853	1855	Died.
Edmund A. Brush	1853	1868	Resigned.
Henry Ledyard	1853	1859	Resigned.
Shubuel Conant	1853	1859	May 1st.
William R. Noyes	1853	1865	Resigned.
Alexander D. Frazer	1855	1871	May 1st.
Julius D. Morton	1859	1865	Died.
John V. Ruehl	1859	1861	Resigned.
Chauncy Hurlbut	1861—1863	1868—1885	Died.
Stanley G. Wight	1863	1868	May 1st.
Jacob S. Farrand	1865	1890	May 1st.
John Owen	1865	1879	May 1st.
Caleb Van Husan	1868	1872	May 1st.
Samuel F. Hodge	1871	1879	Resigned.
Elija Smith	1872	1877	May 1st.
Michael Martz	1877	1887	May 1st.
James Beatty	1879	1885	Died.
John Pridgeon	1879—1884	1886—1891	May 1st.
Marshall H. Godfrey	1884	1889	Resigned.
Edwin F. Conley	1885	1886	May 1st.
Samuel G. Caskey	1885	1895	May 1st.
Joseph Nagel	1887	1890	Died.
August Goebel	1889—1894	1897—1898	Resigned.
Henry M. Duffield	1890	1895	May 1st.
Joseph L. Hudson	1890	1894	May 1st.
Frank E. Kirby	1891	1896	May 1st.
Albert L. Stephens	1894	1897	May 1st.
D. W. H. Moreland	1894	1896	Resigned
Clarence A. Black	1894	1894	Resigned.
Edward W. Pendleton	1894	1909	May 1st.
Darius D. Thorp	1895	1905	May 1st.
John P. Huckestein	1896	1897	Resigned.
John W. McGrath	1896	1901	May 1st.
Joseph J. Noeker	1898	1902	May 1st.
James W. Millen	1897	1898	May 1st.
James Meathe	1898	1899	Died.

Roll of Commissioners—*Continued*

Benjamin Guiney	1899	1900	Resigned.
John Zynda	1900	1908	May 1st.
Joseph J. Crowley	1901	1906	May 1st.
John Schoeder	1902	1907	May 1st.
John F. Dodge	1905	1910	May 1st.
Frederick J. Clippert	1906	1911	May 1st.
James H. Pound	1907	1912	Resigned.
Basil A. Lemke	1908	1913	May 1st.
John Gillespie	1910	1913	Resigned.

MEMBERS OF THE BOARD 1912-1913.

JAMES WILKIE

EMIL STROH

GEORGE LANE

JAMES J. BRADY

THOMAS F. COMERFORD

The SIXTY-SECOND ANNUAL REPORT of the Board of Water Commissioners of the City of Detroit

For the Year Ending
June 30th, 1914

EMIL STROH
PRESIDENT

JAMES J. BRADY

BENJ. F. GUINEY

THOMAS F. COMERFORD

GEORGE LANE
VICE-PRESIDENT

SIXTY-SECOND ANNUAL REPORT

OF THE

Board of Water Commissioners

OF THE CITY OF DETROIT

TO THE

COMMON COUNCIL OF THE CITY OF DETROIT

Together with the Reports of the Officers
of the Board

FOR THE YEAR ENDING JUNE 30, 1914

DETROIT, MICH.
DETROIT FREE PRESS PRINTING COMPANY
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CONTENTS

Page

Report of the Commissioners 9

Financial Report of the Secretary 11

Report of the General Superintendent................................ 20

Summary of Statistics 37

Roll of Commissioners 41

Engin. Lib
Gift
Prof. Hoad
1-27-32

Board of Water Commissioners

OF THE

City of Detroit

MEMBERS

EMIL STROH, 1915 GEORGE LANE, 1916
JAMES J. BRADY, 1917 THOMAS F. COMERFORD, 1918
BENJ. F. GUINEY, 1919

COMMITTEES

WAYS AND MEANS	Commissioners COMERFORD and BRADY
EXTENSION AND CONSTRUCTION	Commissioners LANE and COMERFORD
WATER WORKS PARK	Commissioners BRADY and GUINEY
SUPPLIES	Commissioners GUINEY and LANE

The President is ex-officio member of each Committee.

OFFICERS

PRESIDENT	EMIL STROH
VICE PRESIDENT	GEORGE LANE
SECRETARY AND PURCHASING AGENT	H. S. STARKEY
GENERAL SUPERINTENDENT	THEODORE A. LEISEN
AUDITOR AND PAYMASTER	J. W. LOEFFLER
CHIEF ENGINEER AT PUMPING STATION	HARRY W. GOULD
BOOKKEEPER	GEORGE BARRIE
CASHIER	CHARLES W. KEENA
PERMIT CLERK	C. V. GESLEY
CHIEF CLERK, RATE DEPARTMENT	WALTER C. BOWEN
CHIEF CLERK, METER DEPARTMENT	CHAS. F. GILMER

The Board of Water Commissioners

OF THE

City of Detroit

Rates Adopted June 15th, 1909

FROM JULY 1ST, 1909

Payable Quarterly	Quarterly
First 30,000 gallons	**$1 75**
All in excess of 30,000 gallons	**3 cts. per M.**
Minimum rate	**1 75**

ASSESSMENT RATES

	Per Annum
For Family, household purposes, each family	**$3 20**
Stores and Offices, from	**$1 00 to $12 00**
Boarding Houses, in addition to family rate, each boarder or roomer	**40**
Estimated quantities of water, each 1,000 gallons	**07**
Building Purposes, each 1,000 brick	**03**
“ “ each 100 yards plastering	**05**
“ “ each perch stone	**01**
“ “ minimum	**50**
Automobiles, each	**1 20**

FIXTURES

Bath Tub, for families, each	**1 00**
“ public, each tube	**4 00**
Automatic Water Closets, for family, 1st closet	**1 60**
“ “ “ each, additional	**60**
Rod Water Closets, not less than	**6 00**
Urinals, not less than	**2 00**
Wash Hand Basin, for family, each	**50**
“ “ “ for other purposes, each person	**15**
Hose Bibb or connection, Premises 30 feet front or less	**1 00**
“ “ “ “ 30 feet to 60 feet	**1 40**
“ “ “ “ 60 feet to 100 feet	**2 00**

Special rates for larger grounds.

Fountains	**$10 00 to 20 00**
Street Sprinklers, each wagon	**50 00**

Where there is a waste of water an increase of rates will be made.

Annual Report

OF THE

Board of Water Commissioners

OF THE

City of Detroit

July 1, 1913, to June 30, 1914

TO THE HONORABLE

The Common Council of the City of Detroit.

Gentlemen:—The Board of Water Commissioners of the City of Detroit respectfully presents its annual report for the fiscal year ending June 30, 1914.

The total income of the Board was $2,142,463.12 and the total expenditures were $1,643,574.80. Of the receipts $660,000.00 was from loans and the sale of bonds. The balance was derived from the ordinary receipts of the Board.

The expenditures can be classified under the following heads: for construction $1.087,714.61; for operation and maintenance $253,701.45; for miscellaneous $302,158.74, of which amount $280,909.59 was disbursed for payment of loans and the interest on the bonded indebtedness.

The Board under the Act of 1913, issued and sold $500,000.00 bonds. The Board also sold $10,000.00 bonds of the Oct. 1, 1912 issue. With these issues the total bonded indebtedness is $1,947,000.00.

Three new engines are now installed in the "new" pumping station. The additional pumps increase the capacity of the plant nearly 60 per cent.

The average consumption of water for each person supplied during the fiscal year was 171.2 gallons, 2.8 less than the previous year. This decrease is accounted for by the large number of meters being installed, the Board requiring a meter equipment for all new buildings. When all water services are metered it is expected that the per capita consumption will be reduced to about 110 gallons per day.

Satisfactory progress is being made in the laying of new mains. During the past year a new forty-eight inch line was started. This main will be completed sometime in 1915.

Respectfully submitted,

EMIL STROH,
GEORGE LANE,
JAMES J. BRADY,
THOMAS F. COMERFORD,
BENJ. F. GUINEY,
Commissioners.

Report of the Secretary

To the Honorable the Board of Water Commissioners of the City of Detroit.

Gentlemen:—I respectfully submit the report of the Secretary for the year ending June 30, 1914:

RECEIPTS.

Water rates, assessed	$660,857.82	
Water rates, metered	592,789.22	
Water rates, hydrant rental	475.00	
Percentage	8,264.85	
Shutting-off and letting-on	525.31	
Service cocks, permits	29,126.67	
Service cocks, material and labor	1,264.54	
Plumbers' license	935.00	
City of Detroit, general tax levy	75,000.00	
Service extension	147.96	
Iron pipe, material and labor	21,211.66	
Iron pipe, estimates	58,646.44	
Iron pipe, bonus	5,266.59	
Repairing leaks	260.96	
Meter repairs	1,252.72	
Meter sales	6,089.91	
Real estate, revenue	1,963.00	
Pumping water	518.69	
Horse, wagon and harness	303.00	
Automobile	735.00	
Engineering	70.00	
Office	41.00	
Sinking fund	4,444.44	
Hurlbut fund	4,615.91	
Loans	150,000.00	
Bonds	510,000.00	
Water Works Park	19.25	
Interest, Hurlbut Fund	21.20	
Interest, Sinking Fund	2,794.40	
Interest, General Fund	4,822.58	
Total receipts		$ 2,142,463.12

DISBURSEMENTS.

Office (Operation)—

Pay rolls	$ 33,706.45	
Books, stationery and printing	1,570.07	
Advertising and subscription	1,247.12	
Postage	714.76	
Telephone rental	464.53	
Surety bonds	125.00	
Car tickets	40.00	
New accounting system, partial	500.00	
Miscellaneous	4,503.07	
Total		$ 42,871.00

Inspection (Operation)—

Pay rolls	$ 21,750.05	
Car tickets	730.00	
Miscellaneous	780.63	
Total		$ 23,260.68

Service Connections (Construction)—

Pay rolls	$ 18,405.50	
Service cocks, sleeves and valves, pipes and fittings	9,557.28	
Miscellaneous	84.69	
Total		$ 28,047.47

Pumping Water (Operation)—

Pay rolls	$ 67,533.31	
Coal	53,954.79	
Unloading Coal	5,148.78	
Boiler and engine supplies and repairs	4,288.30	
Oil and waste	1,446.76	
Tools and repairs	71.67	
Hypo-Chloride of lime	5,150.31	
Miscellaneous	3,556.77	
Total		$ 141,150.69

Horse Expense—

Oats, hay and bedding	$ 3,943.08	
Shoeing	201.23	
Veterinary and drugs	71.75	
Pay rolls	2,895.00	
Miscellaneous	678.31	
Total		$ 7,789.37

Horses, Wagon and Harness—		
Wagon and harness repairs	$ 288.85	
Miscellaneous	33.10	
Total	$	321.95
Real Estate, Revenue and Expense—		
Office building alterations	$ 1,961.59	
Office building painting and decorating	1,175.87	
Office building architects est	309.09	
Miscellaneous	551.44	
Total	$	3,997.99
Water Works Park (Operation)—		
Pay rolls	$ 8,236.99	
Tools and equipment	60.68	
Seed, pots and sod	454.07	
Miscellaneous	966.74	
Total	$	9,718.48
Repairing Leaks—		
Material and labor	$ 15,834.71	
Total	$	15,834.71
Meter Repair and Expense—		
Material and labor	$ 8,280.63	
Total	$	8,280.63
Interest—		
General Fund	$ 2,952.09	
Sinking Fund	52,957.50	
Total	$	55,909.59
Bond sale expense	$ 15,750.00	
Total	$	15,750.00
Office Furniture and Fixtures—		
Miscellaneous	$ 156.89	
Total	$	156.89
Hurlbut Fund—		
Pay rolls	$ 5,384.06	
Subscription	3.00	
Total	$	5,387.06
Meter Construction—		
Pay rolls	$ 4,619.00	
Meters	44,205.50	

Special castings and fittings	55.57	
Miscellaneous	537.62	
Total		$ 49,417.69
Engineering (Construction)—		
Pay rolls	$ 24,246.32	
Printing, stationery and supplies	688.31	
Instruments and tools	192.75	
Street car tickets	87.00	
Miscellaneous	2,907.27	
Total		$ 28,121.65
Pumping Works (Construction)—		
Bethlehem Steel Co., on contract	$ 80,168.71	
F. H. Goddard, Inc., on contract	34,468.21	
Pay rolls	35,973.39	
Wickes Boiler Co., on contract	6,208.00	
C. J. Netting Co., on contract	1,001.50	
Russel Wheel & Foundry Co., on contract	1,468.00	
Architects estimates	978.47	
Harrigan & Reid, on contract	200.00	
Johnson, Laren Co., on contract	17,676.00	
Bronze tablet	180.00	
Miscellaneous	4,444.59	
Total		$ 182,766.87
Iron Pipe (Construction)—		
Pay rolls	$260,332.37	
Iron pipe	350,341.98	
Special castings	32,774.16	
Gates, valves and hydrants	44,076.52	
Lead, lead pipe and solder	20,037.31	
Sand, brick, cement and stone	13,127.45	
Lumber and hardware	8,276.32	
Coal	1,972.35	
Tools and repairs	1,038.20	
Lanterns and globes	18.00	
Iron beams and rails	1,991.99	
Car tickets	294.00	
Telephone rental	538.45	
Books, stationery and printing	1,131.20	
Inspection and repaving	12,162.53	
Rubber boots and repairs	148.76	
Packing, waste and rope	2,157.02	
Freight and expressing	874.17	

Medical and hospital service	609.15	
Protecting railroad tracks	296.17	
Refunds	11,357.08	
Automobiles	8,008.65	
Automobile supplies	8,550.42	
Compensation award	200.00	
Team hire	8,564.33	
Time recorder	135.90	
Injury settlements	2,042.92	
Venturi meter	3,600.00	
Miscellaneous	5,016.59	
Total		$ 799,673.99
Loan Account—		
Sinking Fund	$ 50,000.00	
General Fund	175,000.00	
Total		$ 225,000.00
Real Estate—		
Miscellaneous	4.70	
Total		$ 4.70
Plumbers' License—		
Printing	$ 6.00	
Total		$ 6.00
Water Rates—		
Refund	$ 107.39	
Total		$ 107.39

RECAPITULATION OF EXPENDITURES FOR OPERATION AND MAINTENANCE, CONSTRUCTION AND INDEPENDENT.

For Operation and Maintenance—

Office	$ 42,871.00	
Inspection	23,260.68	
Pumping water	141,150.69	
Horse, wagon and harness	321.95	
Real estate, revenue and expense	2,997.99	
Water Works Park	9,718.48	
Repairing leaks	15,834.71	
Meter repair and expense	8,280.63	
Office furniture and fixtures	156.89	
Repairing leaks—horse expense	3,894.68	
Engineering account	4,207.75	
Plumbers' license	6.00	
Total		$ 253,701.45

For Construction—

Service connections	$ 28,047.47	
Meter	49,417.69	
Engineering	23,913.90	
Pumping works	182,766.87	
Iron pipe	799,673.99	
Iron pipe, horse expense	3,894.69	
Total		$ 1,087,714.61

Independent—

Loan account	$225,000.00	
Real estate	4.70	
Hurlbut Fund	5,387.06	
Interest	55,909.59	
Bond sale expense	15,750.00	
Water rates, refund	107.39	
Total		$ 302,158.74

CASH STATEMENT FOR YEAR ENDING JUNE 30, 1914.

		DR.	
Cash on hand, July 1, 1913		$ 10,183.83	
Cash in Bank—			
General Fund	$ 29,787.37		
Sinking Fund	37,603.60		
Hurlbut Fund	870.03		
Secretary Fund	1,000.00		
		$ 69,261.00	
Total receipts		$2,142,463.12	
			$2,221,907.95

		CR	
Cash on hand, June 30, 1914		$ 11,387.21	
Cash in Bank—			
General Fund	$549,933.43		
Less outstanding checks	992.51		
		$ 548,940.92	
Sinking Fund		16,884.94	
Hurlbut Fund		120,08	
Secretary Fund	$ 814.43		
Less outstanding checks	24.20		
Cash on hand	161.37		
		$ 1,000.00	
Total disbursements		$1,643,574.80	
			$2,221,907.95

First and Old Detroit National Bank

Detroit, Mich., Sept. 21st, 1914.

BOARD OF WATER COMMISSIONERS,
Detroit, Mich.

Gentlemen:—This is to certify that the balance standing to your credit on our books at the close of business June 30, 1914, was General Fund, Five Hundred Forty-nine Thousand Nine Hundred Thirty-three,—43|100 Dollars, ($549,933.43), Sinking Fund, Sixteen Thousand Eight Hundred Eighty-four,-94|100 Dollars, ($16,884.94.) Hulburt Fund One Hundred Twenty,-08|100 Dollars ($120.08), Secretary Fund, Eight Hundred Thirty-eight,-63|100 Dollars, ($838.63).

Respectfully yours,
WALTER G. NICHOLSON
Cashier.

BONDED INDEBTEDNESS.

The following table shows the dates of issue and amount of bonds of this department outstanding at this date. The total amount issued by the Board during its existence is $3,990,000, of which $300,000 were refunded and $1,743,000 redeemed, leaving a balance due of $1,947,000.

No. of Issue	Act of	Issued	Payable	Amount	Rate of Int.	Redeemed or Refnd.	Out-standing
7th Refnd.	1873	Jan. 10, 1895	Jan. 10, 1925	$ 100,000	4%		$ 100,000
	1869	Feb. 1, 1900	Feb. 1, 1930	200,000	3½%	$ 20,000	180,000
	1873	Jan. 1, 1903	Jan. 1, 1933	50,000	3½%		50,000
	1873	Sept. 1, 1903	Sept. 1, 1933	150,000	3½%		150,000
	1901	June 1, 1904	June 1, 1934	200,000	3½%		200,000
	1901	Aug. 1, 1904	Aug. 1, 1919	100,000	4%		100,000
	1901	Feb. 1, 1905	Feb. 1, 1935	150,000	3½%		150,000
	1901	Aug. 1, 1908	Aug. 1, 1938	250,000	3½%	75,000	175,000
	1901	July 1, 1909	July 1, 1939	200,000	3½%	98,000	102,000
	1901	Oct. 1, 1912	Oct. 1, 1932	240,000	4%		240,000
	1913	Mar. 1, 1914	Mar. 1, 1944	500,000	4%		500,000
						$193,000	
				$2,140,000			$1,947,000

Respectfully submitted,

H. S. STARKEY,

Secretary.

Report of the General Superintendent

Detroit Mich., July 1, 1914.

To the Board of Water Commissioners of the City of Detroit, Michigan:—

Gentlemen:—I submit herewith the annual report of the Engineering and Construction Departments for the fiscal year ending June 30, 1914, giving a general résumé of the work done in these branches of the service, and complete tabulations of the pumpage records, and also some suggestions and recommendations covering the future work which appears necessary in order to bring the service up to the highest standard of efficiency.

PUMPAGE AND DISTRIBUTION.

The available records of the quantity of water pumped are based on plunger displacement, from which an allowance of five to six per cent. has been made, the percentage of slippage varying with the character of the pumping engines, and the deductions being made on the basis of the quantity recorded by the Venturi meters at the Pumping Station during the period covered by these records. The total pumpage amounted to 40,724,947,672 gallons, of which 29,467,133,317 gallons was delivered to the low service and 11,257,814,355 gallons to the high service.

The average daily consumption of water was 111,575,200 gallons, and the per capita consumption, based on a population of 652,000 for Detroit and the suburbs supplied, was 171.2 gallons, an increase of 5 7/10 per cent. in the general average and a decrease of 1 7/10 per cent. in the per capita consumption as compared with the records of the preceding year.

Of the total quantity pumped 17,075,931,928 gallons or 41.9 per cent. passed through meters, and the "industrial" consumption, which represents the water used for manufacturing industries, railroads, hotels and other business purposes, amounted to 14,688,501,730 gallons. If this quantity be deducted from the total pumpage for the year the remainder would represent the domestic consumption and would give a per capita rate of 111 gallons per day, for domestic purposes only, which is largely in excess of the legitimate requirements and indicates a wanton waste on the part of the consumers.

The maximum hourly consumption for the year occurred on February 9, 1914, when the pumpage showed a daily rate of nearly 183,000,000 gallons or 64 per cent. above the average daily rate, indicating the vast quantity wasted to prevent the freezing of house pipes and fixtures, a condition which can be remedied only by the metering of all services.

A reasonably accurate record of the water used during the year by the Fire Department in extinguishing fires gives a total of 34,900,000 gallons, which is only about eight one-hundredths of one per cent. of the city's consumption.

The total consumption of water in Detroit and suburbs is shown in the following table:

CONSUMPTION OF WATER IN DETROIT AND VILLAGES.

	Total Consumption	Daily Average	Estimated Population
Detroit, unmetered	23,392,273,572	64,088,422	595,000
Detroit, metered	15,448,947,404	42,325,883	
Detroit	38,841,220,976	106,414,305	
Highland Park, metered	867,800,428	2,377,535	22,500
River Rouge, metered	167,768,920	459,640	7,000
Ecorse, metered	32,287,420	88,460	1,800
Hamtramck, metered	517,051,260	1,416,570	16,600
Oakwood, metered	35,636,216	97,635	800
Grosse Pointe, metered	6,440,280	17,645	400
Greenfield, metered	8,724,672	23,910	350
Unmetered Suburbs, estimated	248,017,500	679,500	7,550
	40,724,947,672	111,575,200	652,000

The pumpage records, as noted above, were based on the Venturi meter records, and the difference resulting between these figures and the plunger displacement has made an apparent decrease in the station duty. The actual station duty for the year was 88,906,868 foot-pounds per 100 pounds of coal, with all coal used for heating surrounding buildings charged against pumpage. The trials and experimental work occasioned by the installation of the new pumping engines, and new boilers and stokers, has tended also to reduce the station duty.

The following tabulation gives the cost of operating the Pumping Stations for the year:

	Total	Cost per Million Gallons	Cost per Million Gallons raised 100′
Labor	$67,533.31	$1.66	$1.35
Fuel	59,103.57	1.45	1.18
Oil and Waste	1,446.76	0.04	0.03
Supplies and Waste	4,359.97	0.11	0.09
Miscellaneous	3,556.77	0.08	0.07
Total	$136,000.38	$3.34	$2.72

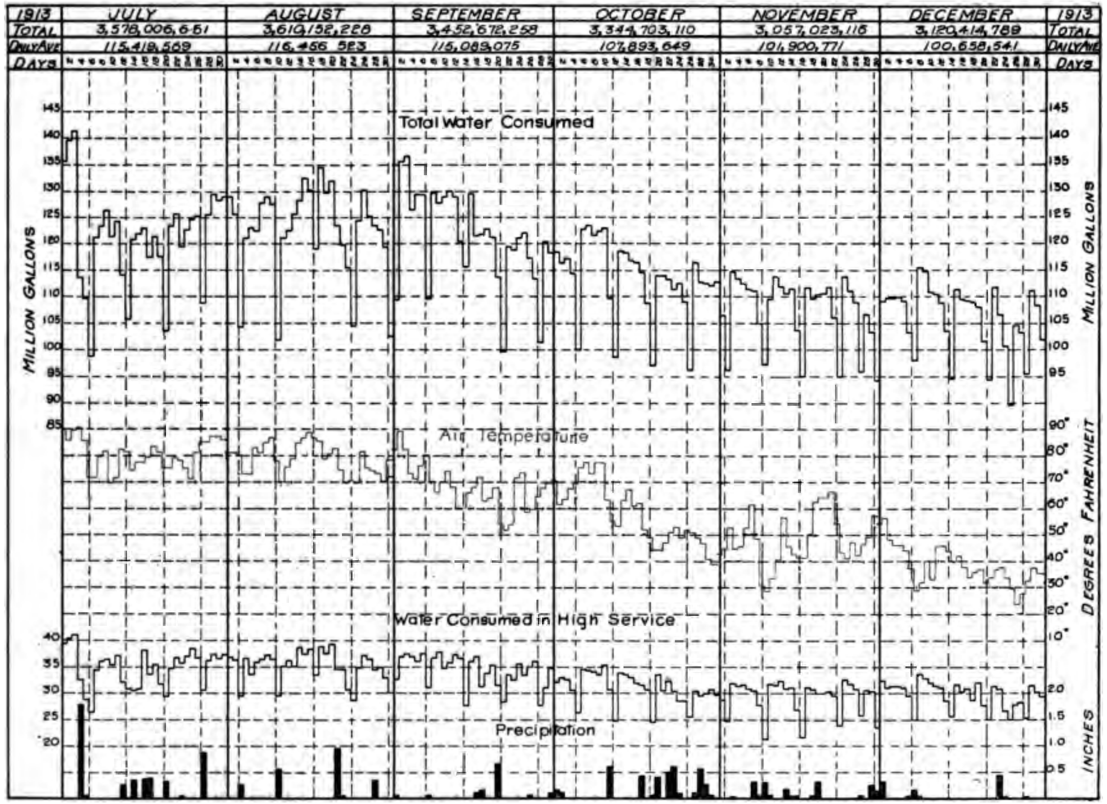
In March, 1913, the treatment of the water supply with Calcium Hypochlorite was started, and this has been continued without interruption since that date. An average of one part of available chlorine to three million parts of water is used, and the result has been the practical elimination of evidence of Bacillus Coli from the treated water. The cost of operation was $5,150.31 for the past year, equivalent to 12½ cents per million gallons.

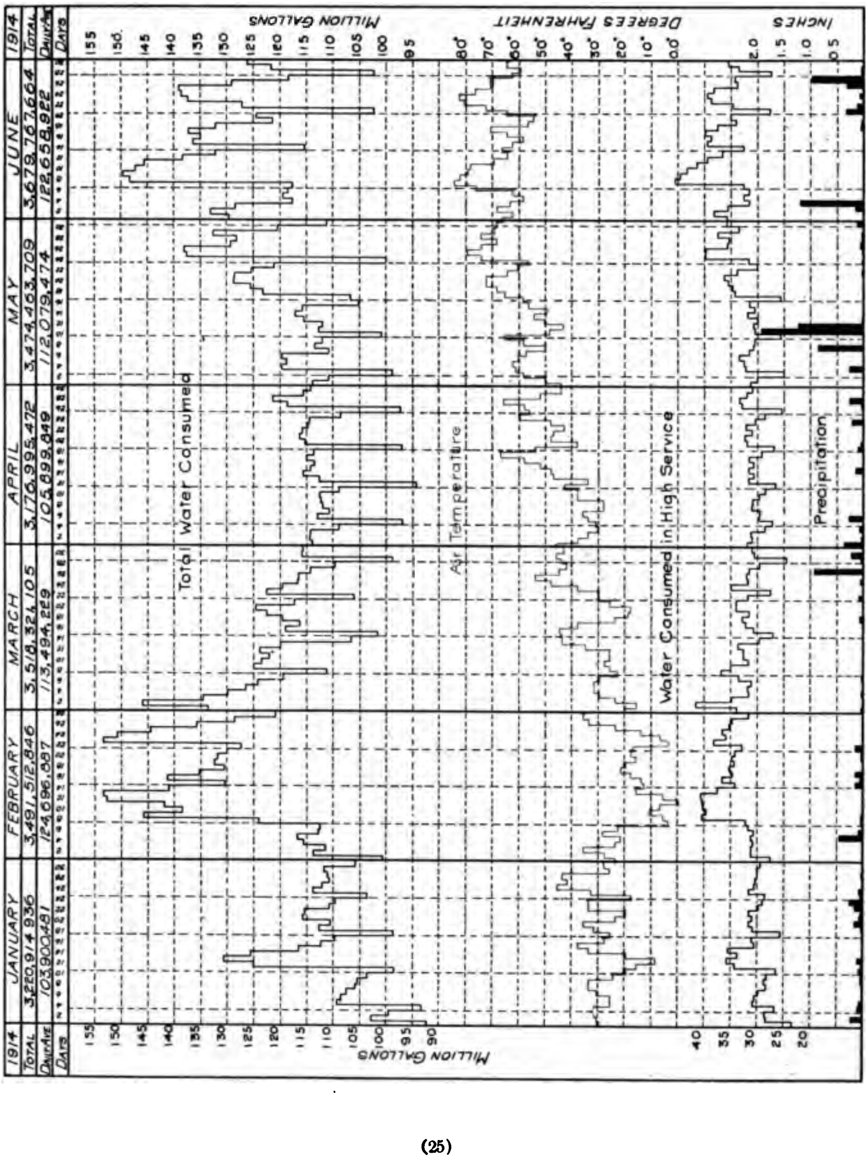
WATER PRESSURE.

The pressures throughout the city show a slight decrease from those of the preceding year, due principally to the increased consumption, but also to the reduction in the initial pressures at the Pumping Station. The average dynamic pressure and head for the year was 47.4 lbs. or 109.4 feet for the low, and 63.7 lbs. or 147.0 feet for the high service, or an average of 53.2 lbs. or 122.7 feet for the whole system. The pressure on the low service will be materially improved next

Table of Pressures.

LOCATION OF GAUGES	Elevati'n above City Datum	Elevati'n above Surface Pump Wells (92.0) at which Engine Gauges are set	July 1, 1912 to June 30, 1913. Average Daily Consumption **105,599,104** gallons. Total Consumption for Year **38,540,022,872** gallons.				July 1, 1913 to June 30, 1914. Average Daily Consumption **111,575,200** gallons. Total Consumption for Year **40,724,947,672** gallons.				Increase or Decrease in Friction During Last Year		Maximum Hour observed Feb. 9, 1914. 7,614,982 gallons 8 a. m to 9 a. m. Daily Rate 182,759,556 gallons		Minimum Hour observed Dec. 24, 1913. 2,768,642 gallons 4 a. m. to 5 a. m. Daily Rate 66,447,408 gallons	
			Pressures, Pounds			Friction'l Loss in Pounds	Pressures, Pounds			Friction'l Loss in Pounds	Pounds		Average Pressure in Lbs.	Fric. Loss in Lbs.	Average Pressure in Lbs.	Fric. Loss in Lbs.
	Feet	Pounds	High	Low	Mean		High	Low	Mean		Inc.	Dec.				
Low Service.																
Pumping Station	92.00	....	59	16	48.9	....	57	32	47.4	....	......	......	48.1	....	45.0	....
Engine No. 32, Hart and Jefferson	103.42	4.9	50	32	42.4	1.6	45	29	40.7	1.8	0.2	......	41.5	1.7	41.5	....
Engine No. 26, Crane and Brinket	125.79	14.6	39	27	32.7	1.6	39	25	31.9	0.9	......	0.7	32.5	1.0	30.0	0.4
Engine No. 7, Concord near Jefferson	124.77	14.2	39	27	33.1	1.6	38	19	32.1	1.1	......	0.5	32.5	1.4	32.0	....
Engine No. 19, Congress, near Jos. Campau	122.47	13.2	37	20	31.3	4.4	36	18	30.4	3.8	......	0.6	30.5	4.4	29.0	2.8
Engine No. 2, Hastings, near Congress	120.98	12.6	34	19	28.2	8.1	34	11	27.8	7.0	......	1.1	26.5	9.0	28.5	3.9
Water Office, Randolph and Jefferson	125.18	14.4	29	16	24.2	10.3	29	11	25.0	8.0	......	2.3	24.0	9.7	26.5	4.1
Engine No. 3, Griswold and Clifford	123.06	13.4	32	19	26.8	8.7	34	15	27.2	6.8	......	1.9	27.5	7.2	29.0	2.6
Engine No. 8, Sixth and Baker	122.14	13.1	32	18	27.2	8.6	34	16	28.2	6.1	......	2.5	18.0	17.0	28.0	3.9
Engine No. 4, Eighteenth, near Howard	116.18	10.5	32	15	26.2	12.2	34	14	27.6	9.3	......	2.9	27.5	10.1	29.0	5.5
Engine No. 10, Sixteenth and Bagg	125.28	14.4	31	11	22.2	12.2	32	13	25.1	7.9	......	4.3	24.5	9.2	26.5	4.1
Engine No. 15, Hubbard near Fort	114.62	9.8	35	16	28.0	11.1	36	16	29.2	8.4	......	2.7	29.5	8.8	31.5	3.7
Engine No. 29, Solvay and W. Jefferson	115.05	10.0	33	15	26.7	12.3	35	16	28.1	9.3	......	3.0	28.5	9.6	30.5	4.5
Truck No. 13, Fort and Lewerenz	115.56	10.2	32	12	25.8	12.9	34	12	27.1	10.1	......	2.8	25.5	12.4	30.0	4.8
Engine No. 27, Junction and Rogers	113.74	9.4	34	14	27.8	11.7	36	15	29.1	8.9	......	2.8	28.5	10.2	31.5	4.1
Engine No. 14, Scotten near Michigan	121.37	12.7	36	16	27.6	8.6	37	18	29.7	5.0	......	3.6	29.0	6.4	32.5	....
Engine No. 22, Michigan, near Hammond	119.14	11.8	32	12	21.7	15.5	32	13	24.6	11.0	......	4.5	24.0	12.3	28.0	5.2
Truck No. 10, Sheridan and Mack	140.25	20.9	31	13	24.2	3.8	28	13	23.2	3.3	......	0.5	24.0	3.2	22.0	2.1
Engine No. 18, Mt. Elliott, near Sylvester	146.23	23.5	29	11	23.3	2.2	26	7	21.3	2.6	0.4	......	21.5	3.1	22.5	....
Engine No. 11, Grandy, near Gratiot	143.21	22.2	29	15	22.6	4.2	27	9	21.7	3.5	......	0.7	23.0	2.9	22.5	0.3
Engine No. 6, High, near Hastings	142.63	21.9	26	15	21.1	5.9	23	6	18.8	6.7	0.8	......	18.0	8.2	19.5	3.6
Storage Yard, Orleans and Erskine	150.64	25.4	20	11	15.9	7.6	20	7	14.5	7.5	......	0.1	14.0	8.7	15.5	4.1
Truck No. 5, Russell and Erskine	147.74	24.1	23	4	16.4	8.3	20	5	15.1	8.2	......	0.1	12.0	12.0	16.0	4.9
Engine No. 5, Alexandrine, near Cass	148.48	24.5	21	7	15.9	8.5	20	4	15.3	7.6	......	0.9	10.0	13.6	17.0	3.5
Engine No. 12, Sixteenth and Grand River	141.55	21.5	22	5	15.8	11.6	23	5	16.9	9.0	......	2.6	16.0	10.6	19.0	4.5
Engine No. 31, Cobb and W. Boulevard	135.12	18.7	25	6	17.2	13.1	25	5	18.5	10.2	......	2.9	18.0	11.4	21.5	4.8
Engine No. 20, Baldwin and Gratiot	145.37	23.1	29	15	22.7	3.1	28	10	21.5	2.8	......	0.3	22.0	3.0	20.5	1.4
High Service.																
Pumping Station	92.00	....	86	45	65.4	....	81	45	63.7	....	......	......	68.5	....	57.5	....
Engine No. 18, Mt. Elliott, near Sylvester	146.23	23.5	50	21	38.2	3.7	52	30	38.4	1.8	......	1.9	40.0	5.0	34.5	....
Engine No. 23, Moran and Boulevard	154.29	27.0	42	23	31.3	7.2	42	19	31.1	5.6	......	1.6	32.0	9.5	27.5	3.0
Engine No. 28, Riopelle and Milwaukee	155.56	27.5	37	15	28.2	9.7	38	16	27.9	8.3	......	1.4	27.0	14.0	26.5	3.5
Engine No. 13, Russel and Ferry	157.30	28.3	34	15	27.1	10.1	34	17	27.4	8.0	......	2.1	27.0	12.2	26.0	3.2
Engine No. 17, Cass and Amsterdam	152.83	26.3	32	7	25.1	14.0	30	11	25.2	12.2	......	1.8	24.0	18.2	26.0	5.2
Engine No. 21, Lincoln, near Piquette	154.88	27.2	32	7	23.6	14.6	29	8	23.2	13.3	......	1.3	22.0	19.3	24.5	5.8
Engine No. 24, Kenilworth, near John R.	155.86	27.6	33	11	26.5	11.3	31	11	25.6	10.5	......	0.8	26.5	14.4	25.5	4.4
Engine No. 12, Sixteenth and Grand River	141.55	21.5	35	10	26.1	17.6	32	11	24.4	17.8	......	0.1	22.5	24.5	26.0	10.0
Highland Park Engine House	163.55	31.1	27	1	18.4	15.9	28	2	17.3	15.3	......	0.6	15.5	21.9	21.0	5.4
Storage Yard, (Set November, 1913)	150.64	25.4	......	......	......	....	42	19	31.0	7.3	......	......	32.5	10.6	27.0	5.1


1913
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
1913
TOTAL
3,578,006,651
3,610,152,228
3,452,672,258
3,344,703,110
3,057,023,116
3,120,414,789
TOTAL
DAILY AVE
115,419,569
116,466 523
115,089,075
107,893,649
101,900,771
100,658,541
DAILY AVE
DAYS
DAYS
Total Water Consumed
Air Temperature
Water Consumed in High Service
Precipitation
MILLION GALLONS
145
140
135
130
125
120
115
110
105
100
95
90
85
40
35
30
25
20
MILLION GALLONS
DEGREES FAHRENHEIT
90°
80°
70°
60°
50°
40°
30°
20°
10°
INCHES
2.0
1.5
1.0
0.5


1914
Total
Daily Ave
Days
JANUARY
3,220,914 936
103,900,481
FEBRUARY
3,491,512,846
124,696,887
MARCH
3,518,324,105
113,494,229
APRIL
3,176,995,472
105,899,849
MAY
3,474,463,709
112,079,474
JUNE
3,679,767,664
122,658,922
Million Gallons
155
150
145
140
135
130
125
120
115
110
105
100
95
90
Degrees Fahrenheit
80°
70°
60°
50°
40°
30°
20°
10°
0.0°
Inches
2.0
1.5
1.0
0.5
40
35
30
25
20
Total Water Consumed
Air Temperature
Water Consumed in High Service
Precipitation

year in many sections of the city on account of the increased supply which will be furnished by the new forty-eight inch main from the Pumping Station to Warren and Vinewood Avenues, and the various connections between this and other large distributing mains. No great increase in the pressure of the high service can be promised until the improvements now under consideration can be carried out. The tabulated statement of the pressures over the entire city gives all the facts in detail.

PIPE SYSTEM.

During the past year 43.7 miles of new water mains were laid, and 3.1 miles were discontinued, resulting in a net increase of 40.6 miles for the year and making a total of 917.1 miles of pipe in the whole system, of which 108.8 miles or nearly 12 per cent. is outside of the present city limits.

The total cost of all pipe lines laid during the year, as recorded for completed lines, was $703,087.49, and $80,612.49 was expended in making forty-eight inch connections, and laying forty-eight inch pipe with the various gate valves and branches in the grounds at the Pumping Station.

The most important feature of the pipe work for the past year was the laying of 10,175 feet of forty-eight inch pipe on the Charlevoix Avenue main. This work was practically completed from the Pumping Station to Erskine and Russell Streets, and will be carried on as rapidly as possible as far as Warren and Vinewood Avenues.

On High Street 1,946 feet of forty-eight inch main was laid between Woodward and Grand River Avenues, completing this line, and 422 feet of forty-eight inch main was laid on Garland Avenue for future extensions.

The following tabulated statements give in detail the lengths and costs of all sizes of mains laid in the City of Detroit and suburbs during the past year, together with other details of the distribution system, and also the cost of work made necessary by grade separation principally around the new Michigan Central Station.

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Summary of the Amount of Pipe Laid in Detroit and Outside Villages, Year ending June 30, 1914

			Cost of Construction		
	Feet	Size	Material, Etc.	Labor	Total
	45,378	6"			
	77,007	8"			
	3,107	10"			
	14,706	12"			
City of Detroit	9,708	16"			
	8,324	24"			
	5	30"			
	1,731	42"			
	13,933	48"	$433,232.04	$204,212.59	$637,444.63
Village of Grosse Pointe Parks	253	6"	248.74	176.88	425.62
Village of Hamtramck	8,779	6"			
	1,927	8"	8,760.27	4,029.07	12,789.34
Township of Hamtramck	4,917	6"			
	1,337	8"	4,844.30	2,817.37	7,661.67
Village of Highland Park	445	8"	656.61	224.31	880.92
Township of Greenfield	12,096	6"			
	12,894	8"	19,354.08	8,709.57	28,063.65
Village of Oakwood	257	6"	413.43	305.92	719.35
Village of St. Clair Heights	5,137	6"			
	122	8"	3,249.29	1,831.56	5,080.85
Village of Ecorse	6,188	6"			
	2,445	8"	6,588.03	3,433.43	10,021.46
	230,726		$477,346.79	$225,740.70	$703,087.49

Work Made Necessary by Grade Separation and New Michigan Central Station, Year ending June 30, 1914

May 12.	Newark, 16th to 19th (Laying 8" and 12" mains)	$3,574.78
July 19.	17th and Rose (Capping 6" pipe)	117.82
June 11.	2nd, N. Amsterdam to Baltimore (Laying 12" main)	2,471.24
Nov. 5.	Cass, N. Amsterdam N. (Laying 12" pipe)	982.53
Oct. 29.	Depot Esplanade, 17th, 18th and Rose (Laying 12" pipe)	4,207.15
Dec. 10.	Central & M. C. R. R. (Laying and lowering 12" pipe)	1,085.20
May 5.	Cass, Baltimore S. (Laying 12" pipe)	706.65
	Total	$13,145.37

Distribution System, Year ending June 30, 1914

Size	Laid During Year Feet	Laid During Year Per Cent	Discontinued During Year	Total in System June 30, 1914 Feet	Total in System June 30, 1914 Per Cent	Total Feet Outside Detroit June 30, 1914	No. of Gates In System June 30, 1914		No. of Service Connections in System June 30, 1914		No. of Meters In System June 30, 1914	
2″				4,624	0.0955							
3″			551	50,838	1.0498		3″	27	⅝″	83,027	⅝″	9,982
4″			11,653	771,309	15.9279	33,678	4″	2090	1″	30,639	¾″	3,287
6″	83,035	35.989	3,156	2,250,416	46.4723	356,477	6″	4741	2″	1,180	1″	1,979
8″	96,177	41.685	527	836,907	17,2826	151,903	8″	1951	3″	667	1½″	631
10″	3,107	1.347	273	246,455	5.0894	7,823	10″	569	4″	375	2″	622
12″	14,706	6.372	90	206,823	4.2710	13,670	12″	464	6″	170	3″	246
16″	9,708	4.208		105,769	2.1844	10,202	16″	135	8″	10	4″	177
18″				87	0.0018		18″	2	10″	2	6″	91
20″				393	0.0081		20″	11	12″	1	8″	5
24″	8,324	3.608		107,504	2.2200	626	24″	88			10″	1
30″	5	.002		54,634	1.1282		30″	44			Ind.	30
36″				7,979	0.1647		36″	7				
42″	1,731	.750		118,654	2.4503		42″	77				
45″				103	0.0021		48″	59				
48″	13,933	6.039		79,994	1.6519							
Total	230,726	100.000	16,250	4,842,489	100.0000	574,379		10,265		116,071		17,051
Miles	43.70		3.08	917.14		108.78						

PUMPING STATION AND GROUNDS.

The New Pumping Station has been practically completed, with the exception of a few minor details such as the lighting fixtures, hardware and radiators for the heating system.

Work is in progress also on grading the grounds in front of the New Pumping Station, as much of the material excavated for the foundation and basement of the Station, which had been piled up on the grounds, had to be removed and distributed evenly over the surface.

The work of laying drain pipes, and water supply pipes for sprinkling, as well as the grading and building of the roadways and foot paths is also receiving attention.

The three new thirty million gallons vertical triple expansion crank and fly wheel pumping engines, installed by the Bethlehem Steel Company, have been placed in commission and have all been operating intermittently as the service required. Pumping Engine No. 8 was started in August, 1913; No. 9 in October, 1913, and No. 10 in February, 1914. None of them have undergone the official duty trial, but they are all working in a satisfactory manner.

The four new Wickes vertical water tube boilers have been placed in service during the year, two in September, 1913; one in October, 1913, and one in January, 1914. These boilers are equipped with Detroit Stokers, and with the high grade of coal used at the Station it is evident that the grate area of these stokers is too large to satisfactorily operate the boilers at or near normal rating. A series of tests is now being carried on with a view to determine the changes which may be necessary.

The following is a detailed statement of work done in connection with the building of the New Pumping Station, and the construction of the distributing mains leading from it:

Work Done at New Pumping Station, Year ending June 30, 1914

Building Bumper for Crane	$ 29.83
Moving Stairs in Basement	64.27
Furnishing and Setting Suction Valves	5,407.73
Setting Caps on Thimbles	244.08
Hauling Dirt from Cellar	74.32
Setting Floor Stands	222.84
Grading Grounds	106.97
Furnishing and Setting 72" Valves	13,809.77
Laying 24" overflow line	3,874.99
Building Platforms and setting transformers	72.57
Building Brick Water Tunnel (7'x280')	8,714.10
Building Concrete Steam Tunnel (6'x5½'x259')	4,639.90
Furnishing Material and Making 48" Connections in Grounds	80,612.49
Furnishing and Setting Venturi Meters	11,408.90
Building Sewer	10,037.19
Total	$139,319.95

STORAGE YARD:

The operations of the Storage Yard cover the storing and handling of all material used in the construction of the pipe work; all tapping and repair work in connection with the distribution system; the setting, repairing and testing of meters, and the care and supervision of live stock, wagons, motor trucks and automobiles used in the service.

The following tabulations give detailed statements of the cost and character of the various operations performed at the Storage Yard, and also the work done over the entire system by employes from the yard:

Work Done in Storage Yards, Year ending June 30, 1914

Making and Setting Concrete Posts and putting up gates	$ 885.06
Building Time Recorder House	45.14
Laying 4" Drain, East Yard	157.72
Building Fence, East Yard (North Side)	324.40
Loading, Unloading, Checking and Storing Materials, Cleaning and Trimming Pipe	9,544.56
Cleaning and Caring for Tapping Machines, Lanterns, and other equipment	2,796.19
Night Clerk, watching and care of yards and office	3,744.63
Caring for stables, horses and wagons	3,365.70
Night, Sunday and Holiday Emergency	5,533.20
Making and Repairing Tools	1,921.32
Repairing Wagons	92.53
Horseshoeing	511.57
Clerical Work, Construction	6,195.24
Clerical Work, Operation	1,610.45
Clerical Work, Maintenance	1,986.31
Total	$38,714.02

General Work, Year ending June 30, 1914

Tapping Mains and Inserting 3158 1" and 5302 ⅝" Cocks for Service	$11,449.57
Setting Sleeves and Valves for service (194)	3,624.08
Public Drinking Fountains set (11)	706.77
Examining, Repairing, Cleaning and Setting to grade gate wells and boxes	2,709.07
Building Wells over Gates on Old Lines (136)	5,222.01
Examining, Repairing and Greasing Gates in System	14,055.27
Repairing Leaks and Breaks in Mains (204)	4,110.39
Attending to Leaks in Service Connections (466)	1,682.16
Responding to False Reports of Leaks (98)	224.89
Opening Blow-Offs to Flush Dead Ends	4,751.43
Shutting Service Connections on Account of Non-Payment of Taxes, Leaks, etc., and letting on same	282.62
Examining Air Chambers for Water Hammer	55.00
Examining Hydraulic Elevator Connections	54.64
Curing No-Water and Short Supply Complaints	522.59
Examining Private Connections and Fire Plants to prevent contamination	498.52
Repairing Sunken Trenches over pipe lines	358.80
Caring for Drinking Fountains	657.01
Lowering 6" pipe in Seyburn, S. of Canfield to N. of Warren	1,186.50
Lowering 6" pipe in Mt. Vernon, Oakland to Cameron	359.90
Lowering 6" pipe in 25th, S. of Kirby to McGraw	544.99
Lowering 8" pipe in Seneca, Lambert N.	203.72
Lowering 6" pipe in McKinley, Warren to Merrick	262.40
Lowering 8" pipe in Glynn Ct., Hamilton E.	569.75
Lowering 6" pipe in Hague, Cameron to Russell	491.87
Lowering 8" pipe in Frontenac, Duncan to Harper	408.11
Lowering 6" pipe in Custer, John R. W.	166.19
Lowering 6" pipe in Scotten, McGraw to Cobb	171.36
Lowering 6" pipe in Scotten, Moore to Scovel	282.12
Lowering 6" pipe in Iroquois, Moffatt to Warren	1,468.99
Lowering 8" pipe in Lafayette, Beard to Green	354.90
Setting Blow-Off, Wade and Boulevard	28.84
Altering Hydraulic Gate Pumps, E. Lafayette 42" Line	828.42
Setting Air Valve, Sheridan and Forest	21.15
Setting Air Valve, Bewick N. of Mack	23.91
Putting on gate key extensions, E. and W. Sides	388.57
Killing 4" pipe, A. N. of Madison, Randolph to John R	11.02
Killing 3" and 4" pipe, Monroe, Farmer to Cadillac Square	7.06
Moving Blow-Off, Marlborough S. of Freud	38.73
Killing 4" pipe, 19th S. of Jefferson	15.62
Killing 4" pipe, Lorman, Holcomb to Belvidere	79.41
Laying 8" suction line to tunnel, Old Pumping Station	1,169.94
Material supplied and billed to outside parties	5,008.46
Meters supplied and billed to outside parties	3,032.29
Miscellaneous work done and billed to outside parties	10,848.02
City "Pick Up" and Miscellaneous Cartage	1,071.96
Miscellaneous Work Done at Water Works Park	68.41
Miscellaneous Work Done at Emergency Station	6.95
Miscellaneous Work Done at Main Office	73.55
Miscellaneous Work	170.29
Total	$80,328.22

SERVICES AND METERS.

There were 8,654 service taps made during the year, making a total of 133,122 services of all sizes in the system. The taps made were of the following sizes: ,

⅝"	5,302.
1"	3,158.
2"	113.
3"	46.
4"	21.
6"	11.
8"	2.
10"	1.
	8,654

During the year 6,079 new meters were installed and 2,330 meters were removed—a net increase of 3,749, making a total of 17,051 meters in service This represents 12.8 per cent. of all services, while the quantity of water passed through the meters was 41.9 per cent. of the total consumption, and produced 47.3 per cent. of the revenue derived from the sale of water.

The accompanying tables give the number of meters of each size set and removed during the year, and the total number in service; the cost of installing and of testing meters, and a detailed list of the various types of meters in use.

Number of Meters Set, Year ending June 30, 1914

	⅝"	¾"	1"	1½"	2"	3"	4"	6"	8"	10"	Ind.	Total
In service July 1, 1913..	7633	2306	1698	585	572	219	171	80	4	.	34	13,302
Set During Year Ending June 30, 1914.......	3795	1485	597	71	74	32	12	11	1	1	..	6,079
	11428	3791	2295	656	646	251	183	91	5	1	34	19,381
Removed during year ending June 30, 1914.......	1446	504	316	25	24	5	6	..	.	.	4	2,330
Total in service........	9982	3287	1979	631	622	246	177	91	5	1	30	17,051

Cost of Installing Meters, Year ending June 30, 1914

Size	Number	Labor and Cartage	Material	Total	Average Labor and Cartage	Average Material	Average Cost
⅝″	2343	$ 891.04	$13,288.00	$14,179.04	$0.38	$ 5.67	$ 6.05
¾″	977	370.28	8,157.95	8,528.23	0.38	8.35	8.73
1″	292	140.60	3,212.00	3,352.60	0.48	11.00	11.48
1½″	42	70.81	924.00	994.81	1.69	22.00	23.69
2″	49	80.51	1,764.00	1,844.51	1.64	36.00	37.64
3″	*27		....			65.00	65.00
4″	* 6					120.00	120.00
6″	*11					250.00	250.00
8″	‡ 1						
10″	‡ 1						
Total..	3749	$1,553.24	$27,345.95	$28,899.19			

*Set by Consumer.

‡Set and supplied by Consumer.

Cost of Testing Meters, Year ending June 30, 1914

Sizes	Number	Flows	Cost	Average
⅝″	3795	Full to 1/32″	$298.84	$0.08
¾″	1485	Full to 1/32″	119.64	0.08
1″	597	Full to 1/32″	62.89	0.10½
1½″	71	Full to 1/16″	18.81	0.26½
2″	74	Full to 1/16″	19.62	0.26½
3″	32	Full to 1/16″	35.84	1.12
4″	12	Full to ⅛″	13.71	1.14
6″	11	Full to ⅛″	14.82	1.35
8″	1	Full to ⅛″	2.16	2.16
10″	1	Full to ⅛″	2.70	2.70
	6079		$589.03	

Kind of Meters in Service, Year ending June 30, 1914

	⅝″	¾″	1″	1½″	2″	3″	4″	6″	8″	10″	Ind.	Total
Crown	1	....	3	...	1	...	...	..	.	.	..	5
Hersey Rotary	...	....	8	2	1	...	6	..	.	.	..	17
Hersey Detector	...	....	...	...	...	1	8	19	4	1	..	33
Hersey Disc "F"	11	5	2	...	...	...	...	..	.	.	..	18
Hersey Disc "D"	13	3	...	12	15	5	3	1	.	.	..	52
Hersey Torrent	...	....	...	...	...	5	3	3	1	.	..	12
Worthington Piston	...	1	2	...	2	2	1		.	.		8
American	28	9	4	7	2	...	...	..	.	.	..	50
Keystone	30	8	5	3	2	...	2	..	.	.	..	50
King	23	6	3	2	3	...	...	..	.	.	..	37
Watch Dog	1890	209	84	36	35	...	...	..	.	.	..	2254
Worthington "D"	3406	1358	466	69	84	34	32	24	.	.	..	5473
Thomson	4580	1688	1402	500	476	199	120	43	.	.	..	9008
Nilo	...	....	...	...	1	...	1	..	.	.	..	2
Eureka	...	....	...	...	...	...	1	1	.	.	..	2
Indicator	...	....	...	...	...	...	...	..	.	.	30	30
	9982	3287	1979	631	622	246	177	91	5	1	30	17051

RECOMMENDATIONS.

The low prevailing pressures and inadequate supply of water in many sections of the city demand that immediate steps be taken to remedy the trouble. With this object in view the work of completing the lines of large supply mains is being pushed, and other large mains are recommended to be laid as rapidly as possible. A forty-eight inch connecting main is projected from Fourth and Brainard south on Fourth, Pine and Sixth, to Jefferson, designated to cross-connect with the other large mains at Bagg, High, Abbott, Fort and Congress Streets, and to form a loop eventually with the projected forty-eight inch main on Jefferson Ave. The construction of the forty-eight inch main on Jefferson Ave. from the Pumping Station to Sixth Street, together with the connecting main referred to, and the completion of the Charlevoix Street main extended out Grand River and Warren to Vinewood Avenue, will provide an ample supply for the low service system.

The extension of the proposed forty-two inch main from Canfield and St. Antoine to Twelfth St. and Grand Blvd., connecting there with the twenty-four inch main on Grand Boulevard, will add materially to the supply on the high service in the northwesterly section of the city.

It is proposed also to run a thirty-six inch main northwardly on Twelfth Street from the forty-two inch main at the Boulevard, extending it for the present to Webb Ave., and also to extend the forty-two inch main northward on Russell St., from Westminster Avenue to Woodland Avenue, and to cross-connect this, and the thirty-six inch main on Twelfth Street with the twenty-four inch main on Woodland and Webb Avenues, and also extend the twenty-four inch main on Hazelwood Avenue to Twelfth Street. By the extension of these main arteries to the high service system, a loop connection will be provided of ample size to meet the requirements of the sections served.

The forty-two inch high service main on Sylvester is reduced to thirty-six inches from the Grand Boulevard and Sylvester to Canfield and Elmwood. In order to give this reduced section the same capacity as the remainder of the line it is proposed to supplement it with a twenty-four inch main between the points of reduction, a distance of 7,250 feet.

The question of metering all services is one which should be given serious attention, but in order to do this a system of meter rates must be devised which will meet the various existing rates and conditions, without working a hardship on any small consumer, and yet provide sufficient revenue to cover all operating and ordinary construction expenses. I would recommend that such a system of meter rates be established to go into effect at the beginning of the next fiscal year.

Appended hereto, and forming a part of this report, are certain additional tables and charts, and also a summary of statistics which gives in concise form the salient facts relating to the Water Works and their operation.

Respectfully,

THEODORE A. LEISEN,
General Superintendent.

Pumpage Records

MONTH.	HIGH SERVICE.		LOW SERVICE.		TOTAL.	
	Total Gallons.	Daily Average Gallons.	Total Gallons.	Daily Average Gallons.	Total Gallons.	Daily Average Gallons.
July	1,025,405,775.	33,077,605.	2,552,600,876.	82,341,964.	3,578,006,651.	115,419,569.
Aug.	1,032,217,750.	33,297,346.	2,577,934,478.	83,159,176.	3,610,152,228.	116,456,523.
Sept.	976,167,275.	32,538,909.	2,476,504,983.	82,550,166.	3,452,672,258.	115,089,075.
Oct.	913,604,645.	29,471,117.	2,431,498,560.	78,422,534.	3,344,703,110.	107,893,649.
Nov.	830,931,750.	27,697,725.	2,226,091,366.	74,203,045.	3,057,023,116.	101,900,771.
Dec.	873,278,000.	28,170,258.	2,247,136,783.	72,488,283.	3,120,414,789.	100,653,541
Jan.	881,814,600.	28,445,635.	2,339,100,336.	75,454,849.	3,220,914,936.	103,900,481.
Feb.	925,558,875.	33,055,674.	2,565,953,971.	91,641,213.	3,491,512,846.	124,696,887.
March	945,955,375.	30,514,689.	2,572,365,730.	82,979,539.	3,518,320,105.	113,494,229.
April	861,706,525.	28,723,550.	2,315,288,947.	77,176,298.	3,176,995,472.	105,899,849.
May	956,025,375.	30,839,528.	2,518,438,344.	81,239,946.	3,474,463 709.	112,079,474
June	1,035,148,500.	34,504,950.	2,644,619,158.	88,153,971.	3,679,767,664.	122,648,922.

Summary of Statistics

For the Year ending June 30, 1914

In form recommended by the New England Water Works Association.

Detroit Water Works,
Detroit, Wayne County, Michigan.

GENERAL STATISTICS.

Population by U. S. Census of 1910, 465,766.

Date of construction, 1827.

By whom owned. The Board of Water Commissioners of the City of Detroit.

Source of supply, Detroit River, near Lake St. Clair.

Mode of supply, pumping.

PUMPING STATISTICS.

Builders of pumping machinery—

One 24,000,000 gallon, Compound Beam, Detroit Locomotive Works, Detroit, Michigan.

One 24,000,000 gallon, Compound Beam. Riverside Engine Works, Detroit, Michigan.

One 30,000,000 gallon, Compound Beam. Riverside Engine Works, Detroit, Michigan.

One 24,000,000 gallon, Triple Expansion. E. P. Allis & Co., Milwaukee, Wis.

Two 25,000,000 gallon Triple Expansion Allis-Chalmers Co., Milwaukee, Wis.

One 25,000,000 gallon, Triple Expansion. Holley Mfg. Co., Buffalo, N. Y.

Three 30,000,000 gallon, Triple Expansion. Bethlehem Steel Co., South Bethlehem, Pa.

Description of fuel used—

a. Kind, bituminous, run of mine.

b. Brand of coal, Meadowbrook, W. Va.

c. Average price of coal per gross ton (2,240 lbs.) delivered at Water Works $2.86

d. Percentage of ash, 5.07% from Laboratory Analyses.

e. Wood, price per cord, none used.

Coal consumed for the year, 46,874,865 lbs.
Amount of other fuel used, none.

Total Pumping for Year—

High Service	11,257,814,355 gallons
Low Service	29,467,133,317 gallons
Total	40,724,947,672 gallons

An allowance of 6% for slip for three compounds and one triple expansion engine, and 5% for slip for six triple expansion engines.

Average static head against which pumps work. Direct pressure. No reservior.

Average dynamic head against which pumps work—

High Service	63.7 lbs., 147.0 ft.
Low Service	47.4 lbs., 109.4 ft.
Whole System	53.2 lbs., 122.7 ft.

Number of gallons pumped per pound of equivalent coal, 869.

$$\text{Duty} = \frac{\text{Gallons pumped x 8.34 (lbs.) x 100 x dynamic head}}{\text{Total Fuel Consumed.}} = 88,906,868$$

Cost of pumping, figured on Pumping Station expenses, $136,000.38
Per million gallons pumped, $3.34.
Per million gallons raised one foot (dynamic), $0.027.

STATISTICS OF CONSUMPTION OF WATER.

Estimated total population at date (City of Detroit)	595,000
Estimated population on lines of pipe	652,000
Estimated population supplied	652,000
Total consumption for the year	40,724,947,672 gallons
Passed through meters	17,075,931,928 gallons
Percentage of consumption metered	41.9
Average daily consumption	111,575,200 gallons
Gallons per day to each inhabitant	171.2
Gallons per day to each consumer	171.2
Gallons per day to each tap	840
Cost of supplying water, per million gallons, figured on total maintenance	$6.23
Total cost of supplying water per million gallons, figured on total maintenance plus interest on bonds	$7.61

STATISTICS RELATING TO DISTRIBUTION SYSTEM.

Mains.

Kind of Pipe, cast iron.
Sizes, from 2-inch to 48-inch.
Extended, 230,726 feet during year.
Discontinued, 16,250 feet during year.
Total now in use, 917.138 miles.
Cost of repairs per mile, $4.48.
Number of leaks per mile, 0.223.
Length of pipes less than 4 inches diameter, 10.500 miles.
Number of hydrants (public) added during the year, 315.
Number or hydrants (public) now in use, 6,033.
Number of cisterns now in use, 526.
Number of stop gates added during year, 434.
Number of stop gates now in use, 10,265.
Number of blow-offs, 1,073.
Number of stop gates smaller than 4 inch, 27.
Range of pressure on mains, 2 lbs. to 81 lbs.

Services.

Kind of pipe, lead and cast iron.
Sizes, ⅝-inch to 12-inch.
Number of service taps added during year, 8,654.
Number now in use, 133,122.
Average length of service, approximately 30 feet.
Number of meters added, 3,749.
Number now in use, 17,051.
Percentage of services metered, 12.8%.
Percentage of receipts from metered water, 47.3%.

FINANCIAL STATISTICS.

Receipts.

Balance brought forward		$ 79,444.83
From ordinary (maintenance) receipts		1,482,463.12
From extraordinary receipts (bonds, etc.)		660,000.00
Total		$2,221,907.95
From Water Rates—		
Fixture rates	$660,857.82	
Meter rates	592,789.22	
Total from consumers		$ 1,253,647.04

For hydrants	475.00
General appropriation	75,000.00
From bond issue	510,000.00
From loans	150,000.00
From other sources	153,341.08
Total	$ 2,142,463.12
Balance brought forward	79,444.83
Total	$ 2,221.907.95

Expenditures.

Water Works Maintenance—		
Operation, management and repairs	$253,701.45	
Interest on bonds and loans	55,909.59	
Total		$ 309,611.04
Payment of loans		225,000.00
Total		$ 534,611.04
Water Works Construction—		
Extension of mains	$799,673.99	
Extension of services	28,047.47	
Extension of meters	49,417.69	
Pumping Station	182,766.87	
Engineering	23,913.90	
Miscellaneous	3,894.69	
Total construction		$ 1,087,714.61
Unclassified Expenses—		
Hurlbut Fund	$ 5,387.06	
Other expenses	15,862.09	
Total		$ 21,249.15
		$ 1,643,574.80
Balance—		
Ordinary	$561,328.13	
Extraordinary	17,005.02	
		$ 578,333.15
Total balance		$ 2,221,907.95

Disposition of balance, devoted to Construction Work—	
Valuation of works	$10,624,702.32
Bonded debt	1,947,000.00
Value of Sinking Fund	86,884.94
Average rate of interest	3½%

Roll of Commissioners and Their Tenure of Office

James A. Van Dyke	1853	1855	Died.
Edmund A. Brush	1853	1868	Resigned.
Henry Ledyard	1853	1859	Resigned.
Shubael Conant	1853	1859	May 1st.
William R. Noyes	1853	1865	Resigned.
Alexander D. Frazer	1855	1871	May 1st.
Julius D. Morton	1859	1865	Died.
John V. Ruehle	1859	1861	Resigned.
Chauncy Hurlbut	1861—1863	1868—1885	Died.
Stanley G. Wight	1863	1868	May 1st.
Jacob S. Farrand	1865	1890	May 1st.
John Owen	1865	1879	May 1st.
Caleb Van Husan	1868	1872	May 1st.
Samuel F. Hodge	1871	1879	Resigned.
Elija Smith	1872	1877	May 1st.
Michael Martz	1877	1887	May 1st.
James Beatty	1879	1885	Died.
John Pridgeon	1879—1884	1886—1891	May 1st.
Marshall H. Godfrey	1884	1889	Resigned.
Edwin F. Conley	1885	1886	May 1st.
Samuel G. Caskey	1885	1895	May 1st.
Joseph Nagel	1887	1890	Died.
August Goebel	1889—1894	1897—1898	Resigned.
Henry M. Duffield	1890	1895	May 1st.
Joseph L. Hudson	1890	1894	May 1st.
Frank E. Kirby	1891	1896	May 1st.
Albert L. Stephens	1894	1897	May 1st.
D. W. H. Moreland	1894	1896	Resigned.
Clarence A. Black	1894	1894	Resigned.
Edward W. Pendleton	1894	1909	May 1st.
Darius D. Thorp	1895	1905	May 1st.
John P. Huckestein	1896	1897	Resigned.
John W. McGrath	1896	1901	May 1st.
Joseph J. Noeker	1898	1902	May 1st.
James W. Millen	1897	1898	May 1st.
James Meathe	1898	1899	Died.
Benjamin Guiney	1899	1900	Resigned.
John Zynda	1900	1908	May 1st.
Joseph J. Crowley	1901	1906	May 1st.

Roll of Commissioners—Continued

John Schroder	1902	1907	May 1st.
John F. Dodge	1905	1910	May 1st.
Frederick J. Clippert	1906	1911	May 1st.
James H. Pound	1907	1912	Resigned.
Basil A. Lemke	1908	1913	May 1st.
James Wilkie	1909	1914	May 1st.
John Gillespie	1910	1913	Resigned.

MEMBERS OF THE BOARD 1913-1914.

EMIL STROH
BENJ. F. GUINEY
GEORGE LANE
JAMES J. BRADY
THOMAS F. COMERFORD

The SIXTY-THIRD ANNUAL REPORT of the Board of Water Commissioners of the City of Detroit

For the Year Ending
June 30th, 1915

President, GEORGE LANE

SIXTY-THIRD ANNUAL REPORT

OF THE

Detroit

BOARD *of* WATER COMMISSIONERS

OF THE CITY OF DETROIT

TO THE

COMMON COUNCIL *of* THE CITY *of* DETROIT

TOGETHER WITH THE REPORTS OF
THE OFFICERS OF THE BOARD

FOR THE YEAR ENDING
JUNE 30, 1915

DETROIT, MICH.
THOS. SMITH PRESS
1916

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BOARD *of* WATER COMMISSIONERS *of* THE CITY OF DETROIT

MEMBERS

GEORGE LANE, 1916
JAMES J. BRADY, 1917
ROBERT OAKMAN, 1918
BENJ. F. GUINEY, 1919
EMIL STROH, 1920

COMMITTEES

Ways and Means	Commissioners BRADY and GUINEY
Extension and Construction	Commissioners GUINEY and OAKMAN
Water Works Park	Commissioners STROH and BRADY
Supplies	Commissioners OAKMAN and STROH

The President is ex-officio member of each Committee.

OFFICERS

President	GEORGE LANE
Vice President	JAMES J. BRADY
Secretary	H. A. GILMARTIN
General Superintendent	THEODORE A. LEISEN
Purchasing Agent and Paymaster	H. S. STARKEY
Auditor	J. W. LOEFFLER
Chief Engineer at Pumping Station	HARRY W. GOULD
Bookkeeper	GEORGE BARRIE
Cashier	D. C. GROBBEL
Permit Clerk	LOUIS MONTGOMERY
Chief Clerk, Rate Department	WALTER C. BOWEN
Chief Clerk, Meter Department	CHAS. F. GILMER

BOARD *of* WATER COMMISSIONERS
of THE CITY OF DETROIT

From July 1st, 1909

METER RATES

Payable Quarterly	Quarterly
First 2,000 cubic feet per quarter, minimum charge.	**90 cts.**
Next 2,000 cubic feet	**44 88/100 cts. per M.**
All additional	**22 44/100 cts. per M.**
Double rates outside of city.	
Minimum rate for terraces and apartments—	
First	**90 cts.**
Each additional	**45 cts.**

ASSESSMENT RATES

	Per Annum
For family, household purposes, each family	**$3 20**
Private stable, for each horse	**1 20**
Livery stable, for each horse	**1 20**
Dray and team horses, each	**1 00**
Cows, each	**1 00**
Boarding houses, in addition to family rate, each boarder or roomer	**40**
Estimated quantities of water, each 1,000 gallons	**07**
Automobiles, each	**1 20**
Bath tub, for families, each	**1 00**
“ public, each tub	**4 00**
Automatic water closets, for family, 1st closet	**1 60**
“ “ “ each additional	**60**
Rod water closets, not less than	**6 00**
Urinals, not less than	**2 00**
Wash hand basin, for family, each	**50**
“ “ “ for other purposes, each person	**15**
Hose bibb or connection, premises 30 feet front or less	**1 00**
“ “ “ “ 30 feet to 60 feet	**1 40**
“ “ “ “ 60 feet to 100 feet	**2 00**

Special rates for larger grounds.

Fountains	**$10 00 to 20 00**
Street sprinklers, each wagon	**50 00**

WATER RATES
for
BUILDING and CONSTRUCTION PURPOSES

Brick	**5c** per M.
Plaster	**7c** per 100 Sq. Yds.
Concrete	**$1.00** per 100 Cu. Yds.
“ 6″ thick or less	**20c** per 100 Sq. Yds.
Tile	**5c** per 100 Cu. Ft.
Each perch stone	**1c**

	No Basement	Complete Basement
One story frame	**$ 50**	**$ 75**
Two story frame	**75**	**1 00**
One story brick	**75**	**1 00**
Two story brick	**1 00**	**1 25**
Two family frame	**1 00**	**1 50**
Two family brick	**1 50**	**2 00**

Where there is a waste of water an increase of rates will be made.

ANNUAL REPORT *of* THE BOARD *of* WATER COMMISSIONERS *of* THE CITY OF DETROIT

July 1, 1914 to June 30, 1915

TO THE HONORABLE
The Common Council of the City of Detroit.

Gentlemen:—The Board of Water Commissioners of the City of Detroit respectfully presents its annual report for the fiscal year ending June 30, 1915.

The total receipts for the year were $~~2~~1,739,065.29, and the total disbursements were $1,931,506.89. The total pumpage for the year was 44,589,423,893 gallons, an increase of 9.4% over that of the previous year. The average daily consumption of water was 122,162,805, equal to a daily per capita consumption of 162 gallons, based on a population of 753,046, a reduction in per capita consumption of 5.4% as compared with the preceding year.

During the year 42.14 miles of new water mains were completed, including 48-inch main which extends from the Pumping Station to Warren and Vinewood Avenues. About 50% of another 48-inch main was also completed during the year, which will extend from the Pumping Station, W. on Jefferson to Sixth, and north to Fourth and Peterboro to connect at that point with another 48-inch main.

Respectfully submitted,

GEORGE LANE,
JAMES J. BRADY,
ROBERT OAKMAN,
BENJ. F. GUINEY,
EMIL STROH,
Commissioners.

H. A. GILMARTIN,
Secretary.

FINANCIAL STATEMENT

July 1, 1914—			
Cash on hand			$ 11,387.12
Cash in bank—			
General Fund		$548,940.92	
Sinking Fund		16,884.94	
Hurlbut Fund		120.08	
Secretary Fund	$1,011.52		
Checks outstanding	11.52		
		$ 1,000.00	
			$ 566,945.94
			$ 578,333.15
Receipts for year ending June 30th, 1915			$1,739,065.29
			$2,317,398.44
Disbursements for year ending June 30, 1915			$1,931,506.89
Balance—			
Cash on hand		$ 9,887.65	
Cash in bank—			
Secretary Fund		1,000.00	
General Fund		279,889.50	
Hurlbut Fund		830.04	
Sinking Fund		94,284.36	
			$ 385,891.55

FIRST AND OLD DETROIT NATIONAL BANK

Detroit, Mich., July 2, 1915.

BOARD OF WATER COMMISSIONERS,
Detroit, Mich.

Gentlemen:—This is to certify that the balance standing to your credit on our books at the close of business June 30, 1915, was General Fund, Two Hundred Eighty-two Thousand Six Hundred Sixty-two and 52/100 Dollars (282,662.52), Sinking Fund, Ninety-four Thousand Two Hundred Eighty-four and 36/100 Dollars ($94,284.36), Hurlbut Fund, Eight Hundred Thirty and 04/100 Dollars ($830.04), Secretary Fund, Ten Hundred Eleven and 52/100 Dollars ($1,011.52).

Respectfully yours,

WALTER G. NICHOLSON,
Cashier.

Cost of Water Service Operations for the Year Ending June 30th, 1915

Pumped at Pumping Station 45,968,478,240 Gallons (Plunger Displacement)

PRODUCTION COST	Half Year Ending December 30, 1914	Half Year Ending June 30, 1915	Total Cost For Year Ending June 30, 1915	Per Million Gallons
Collection and Purification Cost—				
Operation of intake system	$ 172.65	$ 41.78	$ 214.43	
Chemical treatment	6,344.78	4,290.60	10,635.38	
Maintenance of collection and purification plant	3,781.80	682.34	4,464.14	
Depreciation of collection and purification plant	3,929.60	3,929.60	7,859.20	
Direct cost of collection and purification plant	$ 14,228.83	$ 8,944.32	$ 23,173.15	$ .51
Steam Power Cost—				
Fuel for pumping	$ 30,262.15	$ 29,820.42	$ 60,082.57	
Wages for firemen and helpers	12,678.27	13,212.66	25,890.93	
Boiler house supplies	2.60	318.00	320.60	
Maintenance of steam power plant	3,280.51	2,307.48	5,587.99	
Depreciation of steam power plant	4,034.22	4,034.22	8,068.44	
Direct steam power cost	$ 50,257.75	$ 49,692.78	$ 99,950.53	$2.18
Cost of Operating Pumps—				
Wages of assistant engineers and helpers	$ 20,195.95	$ 18,595.55	$ 38,791.50	
Oils, waste and supplies	1,265.75	997.92	2,263.67	
Maintenance of pumping plant	1,546.25	809.51	2,355.76	
Depreciation of pumping plant	14,208.16	14,208.16	28,416.32	
Direct cost of operating pumps	$ 37,216.11	$ 34,611.14	$ 71,827.25	$1.56
Superintendence and general expense	$ 1,777.00	$ 1,879.02	$ 3,656.02	$ .08
Proportion of Overhead Expense—				
Proportion of engineering department expense	$ 1,512.38	$ 1,458.58	$ 3,070.96	
Proportion of administration expense and general expense	1,172.03	486.40	1,657.43	
Total proportion of overhead expense	$ 2,783.42	$ 1,944.98	$ 4,728.39	$ .09
Total cost of water delivered to mains	$106,263.10	$ 97,072.24	$203,335.34	$4.42
DISTRIBUTION COST				
Distribution System Cost—				
Repairing main leaks	$ 2,376.93	$ 1,213.61	$ 3,590.54	
Repair and maintain gates and wells	2,584.72	5,120.57	7,645.28	
Flush mains and blowoff dead ends	1,484.10	1,057.97	2,544.07	
Repair trenches, walks and lawns	2,537.14	238.76	2,775.90	
Miscellaneous maintenance of mains	131.49	......	131.49	

Depreciation of pipe lines	48,409.06	48,409.06	96,818.12	
Depreciation of emergency station	104.90	104.90	209.80	
Direct distribution system cost	$ 57,568.33	$ 56,146.87	$113,715.20	$2.47
Service Cost—				
Repair service leaks	$ 762.29	$ 968.02	$ 1,730.31	
Repair and maintain drinking fountains	408.79	350.25	759.04	
False reports of leaks	34.26	62.10	96.36	
No water and short supply	322.80	214.42	537.22	
Shut-off and let-on	141.43	105.97	247.40	
Miscellaneous inspection expense	389.73	1,123.89	1,513.62	
Total direct service cost	$ 2,059.30	$ 2,824.65	$ 4,883.95	$ .10
Total direct distribution cost	$ 59,627.63	$ 58,971.52	$118,599.15	$2.57
Proportion of Overhead Expense—				
Proportion of general yard expense	$ 7,630.31	$ 8,235.99	$ 15,866.30	
Proportion of engineering expense	3,370.08	1,771.18	5,141.26	
Proportion of administration and general expense	22,252.97	23,350.49	45,603.46	
Total proportion of overhead expense	$ 33,253.36	$ 33,357.66	$ 66,611.02	$1.46
Total distribution cost	$ 92,880.99	$ 92,329.18	$185,210.17	$4.03
METER SERVICE COSTS				
Meter Department Cost—				
Repair and maintain meters	$ 4,051.52	$ 7,051.21	$ 11,102.73	
Remove and replace meters	1,036.14	1,182.67	2,216.81	
Depreciation of meters	2,707.04	2,707.04	5,414.08	
Direct meter cost	$ 7,794.70	$ 10,940.92	$ 18,735.62	$ .40
Proportion of Overhead Expense—				
Proportion of storage yard expense	$ 2,004.22	$ 2,015.38	$ 4,019.60	
Proportion administration and general expense	12,910.61	14,307.76	27,218.37	
Total proportion of overhead expense	$ 14,914.83	$ 16,323.14	$ 31,237.97	$ .69
Total meter costs	$ 22,709.53	$ 27,264.06	$ 49,973.59	$1.09
SUMMARY				
Total cost of water delivered to mains	$106,263.10	$ 97,072.24	$203,335.34	$4.42
Total distribution costs	92,880.99	92,329.18	185,210.17	4.03
Total cost of water pumped and delivered	$199,144.09	$189,401.42	$388,545.51	$8.45
Total meter cost	22,709.53	27,264.06	49,973.59	1.09
Total cost	$221,853.62	$216,665.48	$438,519.10	$9.54

CONSTRUCTION WORK REPORT

Year Ending June 30th, 1915

DEBITS.

Direct cost—		
Work in process July 1, 1914		$ 119,256.34
Materials	$743,778.97	
Pay rolls	442,721.08	
Cartage	12,993.33	
		$1,199,493.38
Overhead expense—		
Storage yard expense	$ 32,388.34	
Engineering department expense	25,384.37	
Administration and general expense	7,367.80	
Total Overhead Expense		65,140.51
		$1,383,890.23

CREDITS.

Water mains, gates and wells, completed jobs	$952,899.96	
Sales of construction works	9,019.52	
Storage yard buildings and improvements	15,120.22	
Total		$ 977,039.70
Work in process June 30th, 1915		$ 406,850.53

PROFIT AND LOSS REPORT

Year Ending June 30th, 1915.

PROFITS.

Water Service Operations—		
Assessment rates	$ 683,800.80	
Meter rates	701,534.53	
Shut-off and let-on	510.55	
Percentage on delinquent accounts	8,699.43	
Total revenue from water service	$1,394,545.31	
Cost of water service operations	438,519.10	
Profit on water service operations		$ 956,026.21
Miscellaneous Revenues—		
Estimates paid for pipe lines	$ 87,409.97	
Bonuses paid for pipe extensions	8,146.26	
Bonuses paid for meters	4,511.78	
Sales of miscellaneous work and material	9,119.53	
Service extensions	100.14	
Plumbers' licenses	1,332.00	
Interest earned on general fund	18,272.38	
Interest earned on sinking fund	5,664.42	
Miscellaneous revenues	3,884.14	
Total miscellaneous revenues		$ 138,440.62
Total		$1,094,466.83

LOSSES.

Interest on bonds	$ 72,845.00	
Interest on loans from sinking fund	3,649.99	
Service connections	1,078.27	
Yard equipment—depreciation on horses and wagons sold	297.87	
Total losses		$ 77,871.13
		$1,016.595.70
Water Works Park, expense		21,200.09
Net profit for year ending June 30th, 1915		$ 995,395.61

ANNUAL BALANCE SHEET

Year Ending June 30th, 1915

ASSETS.	
Current Cash and Bank Accounts:	
Current cash	$ 9,887.65
Cash in bank:	
Secretary's Fund	1,000.00
General Fund	279,889.50
Hurlbut Fund	830.04
Total cash and bank accounts	$ 291,607.19
Accounts Receivable:	
Meter assessments	$ 150,342.50
Flat rate assessments	2,236.89
Miscellaneous accounts receivable	5,347.50
Total accounts receivable	$ 157,926.89
Inventories:	
Stores and supplies at yard	$ 175,314.54
Coal at pumping station	19,343.87
Construction work in progress	406,850.53
Equipment	97,731.69
Total inventories	$ 699,240.63
Plants:	
Collection and purification plant	$ 552,301.64
Steam power plant	296,759.00
Pumping plant, No. 1	1,016,705.23
Pumping plant, No. 2	995,134.76
Water mains, gates and wells	10,634,590.97
Meters in service	332,552.61
Public drinking fountains	8,981.45
Storage yard buildings and improvements	84,759.38
Emergency station	15,723.91
Main office building	54,288.00
Water Works Park, improvements	143,869.86
Total plants	$14,135,666.81
Less reserve for depreciation	2,164,093.90
Total present value of plants	$11,971,572.91
Real estate	863,128.43
Sinking Fund	94,284.36
Total	$14,077,760.41

LIABILITIES, ETC.	
Current Liabilities:	
Pay rolls accrued	$ 11,500.91
Vouchers payable	120,229.60
Unpaid balances on contracts	100,700.00
Interest accrued on bonds	22,923.47
1915-1916 assessment	36,827.34
Total current liabilities	$ 292,181.32
Special Liabilities:	
Liability to injured workmen	$ 2,579.50
Total special liabilities	$ 2,579.50
Bonded Indebtedness	1,947,000.00
Total liabilities	$ 2,241,760.82
Reserves:	
Sinking Fund	$ 94,284.36
Hurlbut Fund	830.04
Total reserves	$ 95,114.40
Surplus	11,740,885.19
	$14,077,760.41

BONDED INDEBTEDNESS.

The following table shows the dates of issue and amount of bonds of this department outstanding at this date. The total amount issued by the Board during its existence is $3,990,000, of which $300,000 were refunded and $1,743,000 redeemed, leaving a balance due of $1,947,000.

Act	Issued	Payable	Amount	Rate of Int.	Redeemed Refnd.	Out-standing
1873	Jan. 10, 1895	Jan. 10, 1925	$ 100,000	4%		$ 100,000
1869	Feb. 1, 1900	Feb. 1, 1930	200,000	3½%	$ 20,000	180,000
1873	Jan. 1, 1903	Jan. 1, 1933	50,000	3½%		50,000
1873	Sept. 1, 1903	Sept. 1, 1933	150,000	3½%		150,000
1901	June 1, 1904	June 1, 1934	200,000	3½%		200,000
1901	Aug. 1, 1904	Aug. 1, 1919	100,000	4%		100,000
1901	Feb. 1, 1905	Feb. 1, 1935	150,000	3½%		150,000
1901	Aug. 1, 1908	Aug. 1, 1938	250,000	3½%	75,000	175,000
1901	July 1, 1909	July 1, 1939	200,000	3½%	98,000	102,000
1901	Oct. 1, 1912	Oct. 1, 1932	240,000	4%		240,000
1913	Mar. 1, 1914	Mar. 1, 1944	500,000	4%		500,000
			$2,140,000		$193,000	$1,947,000

REPORT *of* THE GENERAL SUPERINTENDENT

TO THE BOARD OF WATER COMMISSIONERS OF THE CITY OF DETROIT.

Gentlemen:—I submit herewith the annual report of the Engineering, Construction and Operating Departments for the fiscal year ending June 30, 1915, covering briefly the work done by these branches of the service, and giving in greater detail the records of water pumped, and the data relating to the salient features of the work.

PUMPAGE AND DISTRIBUTION.

The quantity of water pumped is based on the records of the Venturi Meters, and all the figures given indicate the metered quantities, which average three percent less than those derived from the registration of the plunger displacement.

The total pumpage for the year amounted to 44,589,423,893 gallons, of which 28,500,472,963 gallons was delivered to the low service, and 16,088,950,930 gallons to the high service. The total pumpage for the year was an increase of 9.4 percent over that of the previous year, as compared with an increase of over 14 percent in the population of Detroit for the same period. The average daily consumption of water was 122,162,805 gallons, equivalent to a daily per capita consumption of 162.0 gallons for a total population of 753,046 assumed for Detroit and the environs supplied—a reduction in per capita consumption of 5.4 percent as compared with the preceding year.

The quantity of water furnished through metered services amounted to 19,634,913,490 gallons, or 44.0 percent of the total consumption, and produced 50.6 percent of the revenue derived from the sale of water. The industrial consumption, comprising all water used for manufacturing industries, railroads, hotels, and other business purposes, amounted to 15,456,660,000 gallons. Deducting this quantity from the total pumpage leaves 29,132,763,893 gallons, which represents the purely domestic consumption, including all water used for fire protection, sprinkling and flushing streets, and all leakage and waste, and is equivalent to 106 gallons per capita per diem.

The reduction noted in the per capita consumption must be attributed to meteorological conditions, as well as to the increase in metered services, as a large percentage of the meters added during the year were installed in the last few months of the fiscal year—too late to have an appreciable effect on the consumption.

The peak load or maximum consumption for a single hour occurred on June 28, 1915, when the pumpage was at a daily rate of approximately 185,000,000 gallons or 50 percent above the average daily rate, and the hour of minimum consumption occurred on December 6, 1914, the pumpage for one hour being at a rate of 70,000,000 gallons per day.

The record of water used by the fire department during the year shows a total of 18,270,000 gallons taken from the supply mains, which is four hundredths of one percent of the total consumption of the city:

COMPARISON OF METER AND PUMP RECORDS

	Meter Measurement	Plunger Displacement
Maximum day, Aug. 7, 1914	147,929,035	152,504,160
Minimum day, Nov. 29, 1914	93,578,247	96,472,420
Average daily (entire system)	122,162,805	125,941,036
Average daily (high service)	44,079,317	45,442,595
Average daily (low service)	78,083,488	80,498,441
Total for year	44,589,423,893	45,968,478,240
Maximum hour, (entire system) June 28, 1915, 9 A. M. to 10 A. M.	7,718,600	7,957,320

Minimum hour, (entire system) Dec, 6, 1914, 3 to 4 A. M.	2,915,703	3,005,880
Rate per day at maximum hour (entire system)	185,246,410	190,975,680
Rate per day at minimum hour (entire system)	69,976,886	72,141,120

The consumption of water in Detroit and Suburbs supplied, is shown in the following table:

CONSUMPTION OF WATER IN DETROIT AND VILLAGES.

	Total Consumption Gallons	Daily Average Gallons	Estimated Population
Detroit, unmetered	24,704,510,408	67,683,590	
Detroit, metered	17,083,513,594	46,804,147	
Detroit, total	41,788,024,002	114,487,737	678,746
Highland Park, metered	1,456,449,500	3,990,273	27,000
River Rouge, metered	181,364,568	496,889	7,500
Ecorse, metered	45,655,676	125,084	2,500
Hamtramck, metered	780,033,420	2,137,078	25,000
Oakwood, metered	41,824,420	114,587	1,000
Grosse Pointe, metered	25,308,580	69,339	1,500
Greenfield, metered	20,763,732	56,887	800
Unmetered suburbs, estimated, including St. Clair Heights	250,000,000	684,931	9,000
Villages, total	2,801,399,896	7,675,068	74,300
Detroit, total	41,788,024,002	114,487,737	678,746
Total	44,589,423,893	122,162,805	753,046
Total, unmetered	24,704,510,408	67,683,590	
Total, metered	19,884,913,490	54,479,215	
Total pumpage	44,589,423,893	122,162,805	

All computations in connection with the pumpage are based on the meter records and not on plunger displacement. The actual station duty of all pumps was 95,923,000 foot-pounds per 100 lbs. of coal burned, with all coal used for heating surrounding buildings charged against the engines. This is an increase of nearly 8 percent over the results attained the previous year.

The following tabulation gives the actual cost of operating the Pumping Station during the year, and it may be noted that the cost of $3.12 per million gallons of water pumped is 22 cents per million gallons less than the cost for the preceding year—a reduction of 6.6 percent.

COST OF PUMPAGE.

	Total Cost	Cost per Million Gallons	Cost per Million Gallons raised 100′
Labor	$ 68,338.45	$1.53	$1.24
Fuel	60,082.57	1.35	1.09
Oil and supplies	2,584.27	.06	.05
Miscellaneous	7,943.75	.18	.14
Total	$138,949.04	$3.12	$2.52

QUALITY OF WATER.

The treatment of the water supply with calcium hypochlorite was continued uninterruptedly throughout the year, an average of one part of available chlorine to four million parts of water, or about six pounds of hypo per million gallons of water having been used, resulting in the practical elimination of evidence of Bacillus Coli in the treated water.

Daily bacterial analyses of the River Water, and Treated Water, show the following results:

Average number of Bacteria per c. c.:

Gelatine at 20 deg......River Water, 218; Treated Water, 19

Agar at 37 deg........River Water, 15; Treated Water, 4

RIVER WATER—

B. Coli in 1 C. C. sample—positive on 20 days.

B. Coli in 10 C. C. samples—positive on 123 days.

TREATED WATER—

B. Coli in 1 C. C. sample—positive on 1 day.

B. Coli in 10 C. C. samples—positive on 5 days.

WATER PRESSURE

There has been a slight but general increase in the pressures throughout the city on the low service and also to a lesser degree in the high service district. The increased pressure on the low service is due to the greater capacity of the main distribution system occasioned by the completion of the 48-inch main on Charlevoix, Erskine, Peterboro, Grand River and Warren Avenues, which was connected at all available points to other large distributing mains as far west as Vinewood Avenue. The average increase in pressure for the full year, on all the gauges at the various fire engine houses was 1.4 lbs. on the low service and 0.6 lbs. on the high service, but this does not represent the real gain in pressure, as the greatest benefit from the improved conditions is obtained during the period of excessive consumption and correspondingly low pressure. The average low pressure for the year shows an increase of 4.8 lbs. over the previous year's record. The tabulation of pressure records from different points throughout the city gives the information in detail.

PIPE SYSTEM.

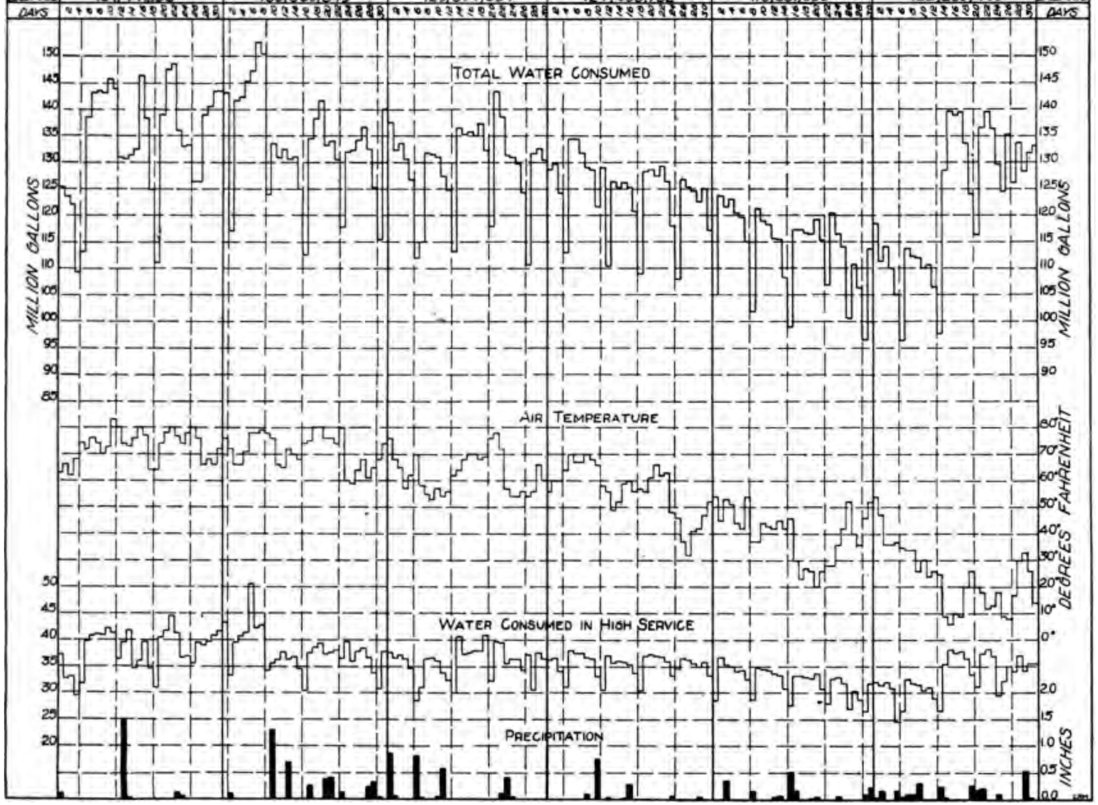
During the year 222,448 feet or 42.14 miles of new water mains were completed and 2.66 miles of small and obsolete mains were taken up, making a net increase of 39.48 miles in the system, resulting in a total of 956.62 miles of mains in the whole system. Of this amount 122.06 miles is outside the city limits. These figures do not include lines, or sections of lines which were in process of construction, but not completed on June 30, 1915. Including such uncompleted lines would make a total of 45.24 miles of mains actually laid during the year.

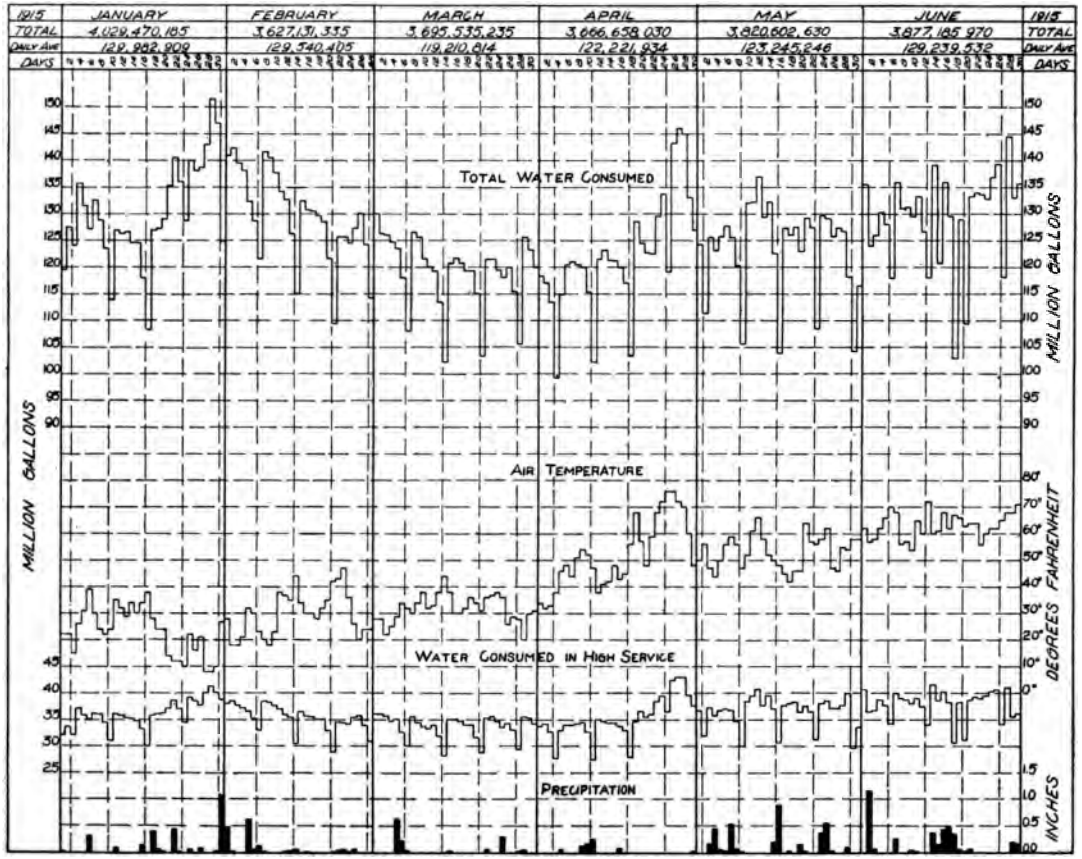
The distribution system contains 140.29 miles of mains 12 inches in diameter and larger, of which 42.24 miles are 42 inches and 48 inches in diameter, 6.12 miles of 48-inch

Table of Pressures.

	LOCATION OF GAUGES	Elevat'n above City Datum	Elevat'n above surface pump wells (92.0) at which engine guages are set	July 1, 1913 to June 30, 1914. Average Daily Consumption 111,575,200 gallons Total Consumption for Year 40,724,947,672 gallons				July 1, 1914 to June 30, 1915 Average Daily Consumption 122,162,805 gallons Total Consumption for Year 44,589,423,893 gallons				Increase or Decrease in Friction During last Year		Maximum Hour observed June 28, 1915, 7,957,320 gals. 9 a. m. to 10 a. m. Daily Rate 190,975,680 gals.		Minimum Hour observed Dec. 6, 1914 3,005,880 gals. 3 a. m. to 4 a. m. Daily Rate 72,141,120 gals.	
				Pressures, Pounds			Fric. Loss in Lbs.	Pressures, Pounds			Fric. Loss in Lbs.	Pounds		Average Pressure in Lbs.	Fric. Loss in Lbs.	Average Pressure Lbs.	Fric. Loss Lbs.
		Feet	Pounds	High	Low	Mean		High	Low	Mean		Inc.	Dec.				
Low Service	Pumping Station	92.00	....	57	32	47.4	....	68	44	47.1	....	......	......	49.2	....	46.5	....
	Engine No. 32, Hart and Jefferson	103.42	4.9	45	29	40.7	1.8	47	33	40.7	1.5	......	0.3	38.0	6.3	42.5	....
	Engine No. 26, Crane and Brinket	125.79	14.6	39	25	31.9	0.9	38	26	32.1	0.4	......	0.5	35.0	....	33.0	....
	Engine No. 7, Concord, near Jefferson	124.77	14.2	38	19	32.1	1.1	38	25	34.2	....	......	......	33.0	2.0	32.5	....
	Engine No. 19, Congress, near Jos. Campau	122.47	13.2	36	18	30.4	3.8	37	25	30.8	3.1	......	0.7	30.5	5.5	32.5	0.8
	Engine No. 2, Hastings, near Congress	120.98	12.6	34	11	27.8	7.0	36	18	28.5	6.0	......	1.0	26.5	10.1	31.5	2.4
	Water Office, Randolph and Jefferson	125.18	14.4	29	11	25.0	8.0	32	19	26.1	6.6	......	1.4	25.0	9.8	29.5	2.6
	Engine No. 3, Griswold and Clifford	123.06	13.4	34	15	27.2	6.8	34	20	28.3	5.4	......	1.4	29.0	6.8	31.5	1.6
	Engine No. 8, Sixth and Baker	122.14	13.1	34	16	28.2	6.1	35	20	29.4	4.6	......	1.5	28.5	7.6	33.0	0.4
	Engine No. 4, Eighteenth, near Howard	116.18	10.5	34	14	27.6	9.3	35	20	28.8	7.8	......	1.5	27.0	11.7	32.0	4.0
	Engine No. 10, Sixteenth and Bagg	125.28	14.4	32	13	25.1	7.9	35	17	26.9	5.8	......	2.1	26.0	8.8	30.0	2.1
	Engine No. 15, Hubbard near Fort	114.62	9.8	36	16	29.2	8.4	37	20	30.1	7.2	......	1.2	29.0	10.4	....	....
	Engine No. 29, Solvay and W. Jefferson	115.05	10.0	35	16	28.1	9.3	36	19	29.5	7.6	......	1.7	28.0	11.2	35.0	1.5
	Truck No. 13, Fort and Lewerenz	115.56	10.2	34	12	27.1	10.1	36	16	28.8	8.1	......	2.0	27.0	12.0	32.5	3.8
	Engine No. 27, Junction and Rogers	113.74	9.4	36	15	29.1	8.9	38	18	30.8	6.9	......	2.0	28.5	11.3	34.0	3.1
	Engine No. 14, Scotten near Michigan	121.37	12.7	37	18	29.7	5.0	39	20	32.0	2.4	......	2.6	31.0	5.5	36.0	....
	Engine No. 22, Michigan, near Hammond	119.14	11.8	32	13	24.6	11.0	35	14	27.0	8.3	......	2.7	26.0	11.4	32.0	2.7
	Truck No. 10, Sheridan and Mack	140.25	20.9	28	13	23.2	3.3	30	17	23.6	2.6	......	0.7	24.0	4.3	25.0	0.6
	Engine No. 18, Mt. Elliott near Sylvester	146.23	23.5	26	7	21.3	2.6	28	14	21.7	1.9	......	0.7	23.0	2.7	24.5	....
	Engine No. 11, Grandy, near Gratiot	143.21	22.2	27	9	21.7	3.5	28	16	24.0	0.9	..	2.6	25.0	2.0	25.5	....
	Engine No. 6, High, near Hastings	142.63	21.9	23	6	18.8	6.7	26	12	20.6	4.6	......	2.1	19.5	7.8	22.0	2.6
	Storage Yard, Orleans and Erskine	150.64	25.4	20	7	14.5	7.5	23	17	16.2	5.5	......	2.0	....	....	18.0	3.1
	Truck No. 5, Russell and Erskine	147.74	24.1	20	5	15.1	8.2	24	7	16.9	6.1	......	2.1	13.5	11.6	21.0	1.4
	Engine No. 5, Alexandrine, near Cass	148.48	24.5	20	4	15.3	7.6	23	8	17.4	5.2	......	2.4	18.5	6.2	17.0	5.0
	Engine No. 12, Sixteenth and Grand River	141.55	21.5	23	5	16.9	9.0	28	11	20.0	5.6	......	3.4	19.0	8.7	22.0	3.0
	Engine No. 31, Cobb and W. Grand Blvd.	135.12	18.7	25	5	18.5	10.2	28	8	21.3	7.1	......	3.1	19.0	11.5	24.5	3.3
	Engine No. 20, Baldwin and Gratiot	145.37	23.1	28	10	21.5	2.8	30	13	21.6	2.4	......	0.4	21.5	4.6	23.0	0.4
	Average	....	....	.....	13.6	25.8	....	.....	18.4	27.2	....	......	......	....	....	....	....
High Service	Pumping Station	92.00	....	81	45	63.7	....	79	45	64.7	....	.....	...	75.8	....	59.0	....
	Engine No. 18, Mt. Elliott, near Sylvester	146.23	23.5	52	30	38.4	1.8	49	30	39.4	1.8	0.0	......	44.0	8.3	36.5	....
	Engine No. 23, Moran and Boulevard	154.29	27.0	42	19	31.1	5.6	43	23	31.9	5.8	0.2	......	36.0	12.8	31.0	1.0
	Engine No. 28, Riopelle and Milwaukee	155.56	27.5	38	16	27.9	8.3	36	17	28.5	8.7	0.4	......	29.0	19.3	29.5	2.0
	Engine No. 13, Russell and Ferry	157.30	28.3	34	17	27.4	8.0	36	18	28.1	8.3	0.3	......	29.5	18.0	28.5	2.2
	Engine No. 17, Cass and Amsterdam	152.83	26.3	30	11	25.2	12.2	33	12	25.9	12.5	0.3	......	23.0	26.5	29.0	3.7
	Engine No. 21, Lincoln, near Piquette	154.88	27.2	29	8	23.2	13.3	31	10	23.7	13.8	0.5	......	20.0	28.6	27.0	4.8
	Engine No. 24, Kenilworth, near John R.	155.86	27.6	31	11	25.6	10.5	33	10	26.4	10.7	0.2		25.5	22.7	28.0	3.4
	Engine No. 12, Sixteenth and Grand River	141.55	21.5	32	11	24.4	17.8	31	9	24.6	18.6	0.8	......	18.5	35.8	29.0	8.5
	Highland Park Engine House	163.55	31.1	28	2	17.3	15.3	27	2	16.7	16.9	1.6	......	....	....	24.5	3.4
	Storage Yard, Orleans and Erskine	150.64	25.4	42	19	31.0	7.3	44	21	31.7	7.6	0.3	......	....	....	32.5	1.1
	Average	....	....	.....	17.2	30.5		.....	18.0	81.1	....	......	......	....	....	....	....

1914	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	1914
TOTAL	4,167,676,995	4,132,326,310	3,881,239,910	3,856,608,700	3,415,549,500	3,788,493,435	TOTAL
DAILY AVE	134,441,193	133,300,849	129,374,664	124,406,732	113,851,650	122,209,466	DAILY AVE




1915
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
1915
TOTAL
4,029,470,185
3,627,131,335
3,695,535,235
3,666,658,030
3,820,602,630
3,877,185,970
TOTAL
DAILY AVE
129,982,909
129,540,405
119,210,814
122,221,934
123,245,246
129,239,532
DAILY AVE
DAYS
DAYS
TOTAL WATER CONSUMED
AIR TEMPERATURE
WATER CONSUMED IN HIGH SERVICE
PRECIPITATION
MILLION GALLONS
MILLION GALLONS
DEGREES FAHRENHEIT
INCHES
150
145
140
135
130
125
120
115
110
105
100
95
90
45
40
35
30
25
80°
70°
60°
50°
40°
30°
20°
10°
0°
1.5
1.0
0.5
0.0

pipe having been completed during the past year, although 8.20 miles of 48-inch pipe was actually laid.

The completion of the 48-inch main in Charlevoix, Erskine, Peterboro, Fourth, Brainard, Grand River and Warren Avenue, and which now extends from the Pumping Station to Warren and Vinewood Avenues, was the most important feature of the current year's work and the utilization of this artery of the distribution system, has been the principal factor in furnishing better pressure in many sections of the city.

The 48-inch main, which will extend from the Pumping Station, West on Jefferson to Sixth, and up Sixth, Pine and Fourth Streets to Fourth and Peterboro, to connect with the other 48-inch main at that point, is being laid in several sections, about three miles, or 50 percent having been laid during the year. Work on both the 48-inch lines was carried on through the winter, and the average cost complete was $20.40 per foot, which includes an expense of $1.36 per foot for repaving, and the proportion of additional expense entailed in tunneling under Woodward Avenue at Erskine, and at Jefferson Avenue, at Dequindre Street, and in dipping under sewers and other cross obstructions at various points.

The widening and double-tracking of Baker Street made it expedient to extend the 48-inch main on that street from Sixteenth Street Westward, to connect with the 24-inch main in Vinewood Avenue. The work was started on May 10th and by June 30th, the main had been laid from Sixteenth Street to a point West of West Grand Boulevard, a total of 3,915 feet.

The 24-inch main in Vinewood Avenue was extended from Buchanan to Warren, connecting there with the new 48-inch main, and making a through 24-inch feeder from Jefferson to Warren Avenue.

The necessity for a better water supply to the Village of River Rouge became manifest early in the year, and as a 16-inch main had been previously laid under the bed of the River Rouge at Jefferson Avenue, but connected only with 8-inch mains on both sides of the River, a new 16-inch extension was made from the end of the 42-inch main in Jefferson Avenue at Home Street to River Rouge, and from the River to the intersection of Burke Street and Jefferson in the Village.

In order to improve the supply in the Northwestern part of the city on the high service, work was started on a 36-inch main on Twelfth Street from the Boulevard North, and was laid as far as Euclid Avenue, and from Twelfth and the Boulevard the 42-inch main was started, extending Southeast on Holden Avenue.

A 24-inch main was laid from Third and Hazelwood to Twelfth and Taylor, at which point it will connect later with the 36-inch main projected on Twelfth Street.

The total cost of all the water mains laid during the year was $937,323.48, and the unit cost per foot of the principal sizes was as follows:

COST PER FOOT.

Size	Material, Etc.	Labor	Overhead Charges	Total.
6″	$ 0.57	$0.32	$0.04	$ 0.93
8″	0.71	0.35	0.04	1.10
10″	0.98	0.58	0.08	1.64
12″	1.27	0.78	0.10	2.15
16″	2.19	1.40	0.18	3.77
24″	4.20	3.30	0.43	7.93
36″	6.12	3.93	0.52	10.57
48″	12.63	6.88	0.59	20.40

The following tabulations set forth in detail the quantity and costs of water mains of all sizes laid during the year both in the city of Detroit, and in the adjacent Villages and

Suburbs and a resume of the present status of the complete distribution system.

Summary of the Amount and Cost of Pipe Laid in Detroit and Outside Villages, Year Ending June 30, 1915

	Feet	Size	Material, Etc.	Labor	Overhead Expense	Total
City of Detroit	313	4″	$ 148.80	$ 228.08	$ 29.85	$ 406.73
	34,979	6″	19,000.79	12,094.93	1,583.55	32,679.27
	62,488	8″	45,159.85	22,218.83	3,061.06	70,439.74
	775	10″	760.88	451.97	59.16	1,272.01
	9,357	12″	11,852.65	7,269.36	951.60	20,073.61
	6,495	16″	14,335.46	8,986.52	1,176.43	24,498.41
	4,520	24″	18,991.40	14,898.81	1,950.26	35,840.47
	17	30″	91.95	63.75	8.35	164.03
	1,106	36″	6,776.21	4,350.79	369.63	11,696.53
	32,309	48″	408,131.35	222,356.28	28,603.66	659,091.29
Village of Hamtramck	20,399	6″	13,218.26	5,596.13	732.52	19,546.91
	6,905	8″	4,514.41	1,804.18	236.16	6,554.75
Township of Hamtramck	2,436	6″	1,633.72	691.66	90.54	2,415.92
	71	8″	45.60	18.22	2.39	66.21
Township of Greenfield	3,188	6″	1,767.96	979.91	128.26	2,876.13
	5,700	8″	3.827.09	1,764.84	230.90	5,822.83
	1,129	16″	1,743.66	615.40	80.55	2,439.61
Village of Oakwood	3,762	6″	2,060.67	1,384.18	181.19	3,626.04
Village of St. Clair Heights	8,132	6″	4,304.43	2,218.29	290.39	6,813.11
	754	8″	469.22	213.76	27.99	710.97
Village of River Rouge	942	6″	510.29	254.95	33.37	798.61
	4,298	16″	9,983.76	7,142.41	934.94	18,061.11
Village of Ecorse	6,589	6″	3,427.16	1,746.90	228.69	5,402.75
Township of Gratiot	1,448	6″	902.35	533.20	69.79	1,505.34
Village of Grosse Pointe Parks	3,874	6″	2,135.00	1,455.07	190.46	3,780.53
	502	8″	402.08	299.31	39.18	740.57
	222,488		$576,194.98	$319,637.73	$ 41,490.77	$937,323.48

Distribution System, Year Ending June 30, 1915

Size	Laid During Year		Discontinued During Year	Total in System		Total Feet Outside Detroit	No. of Gates In System		No. of Service Connections in System		No. of Meters In System	
	Feet	Per Cent		Feet	Per Cent							
2"				4,624	00.0915		3"	27	⅝"	87,056	⅝"	16,258
3"			389	50,449	00.9988		4"	2,086	¾"	414	¾"	8,114
4"	313	00.1407	6,133	765,489	15.1554	33,678	6"	4,887	1"	33,092	1"	2,809
6"	85,749	38.5409	1,439	2,334,726	46.2237	407,247	8"	2,065	2"	1,266	1½"	722
8"	76,420	34.3438	4,548	908,779	17.9923	165,835	10"	572	3"	707	2"	679
10"	775	00.3482		247,230	04.8948	7,823	12"	486	4"	400	3"	271
12"	9,357	04.2100	150	216,030	04.2771	13,670	16"	149	6"	182	4"	194
16"	11,922	05.3600	805	116,886	02.3151	15,629	18"	2	8"	13	6"	97
18"				87	00.0017		20"	11	10"	2	8"	5
20"				393	00.0078		24"	90	12"	1	10"	1
24"	4,520	02.0300	583	111,441	02.2064	626	30"	44			16"	1
30"	17	00.0076		54,651	01.0820		36"	9			Ind.	29
36"	1,106	00.4971		9,085	00.1799		42"	77				
42"				118,654	02.3491		48"	74				
45"				103	00.0020							
48"	32,309	14.5217		112,303	02.2234							
Total	222,488	100.0000	14,047	5,050,930	100.0000	644,508		10,579		123,133		29,180
Miles	42.14		2.66			122.06						

STORAGE YARD.

The work carried on at the Storage Yard and the reports emanating therefrom, embrace the handling of all materials and supplies required in the construction of the pipe lines, the repairing of all broken mains or leaks, tapping mains for service connections; the testing, setting and repairing of meters, and practically all other work required in the maintenance of the distribution system, and the supervision and care of live stock, wagons, motor trucks and automobiles used in the service.

The new garage at the Storage Yard was completed in September, 1914, at a total cost of $13,370.08.

The accompanying tabulated statements furnish in full detail the cost and character of the various operations performed at the Storage Yard.

Division of Storage Yard Labor, Year Ending June 30, 1915

Loading, unloading, checking and storing materials	$ 9,570.03
Cleaning, trimming and plugging salvaged pipe and special castings	517.24
Watching and care of yards, buildings and equipment	4,686.46
Caring for stables, horses, wagons and harness	2,918.61
Night, Sunday and holiday emergency crews	8,423.14
Repairing and maintaining motor vehicles	2,401.81
Repairing wagons and harness	130.47
Repairing and maintaining tools and equipment	8,651.98
Horseshoeing	302.25
Superintendence and clerical work	12,436.83
	$50,038.82

General Work, Year Ending June 30, 1915

Building 51′ x 112′ garage in storage yard	$13,370.08
Tapping mains and inserting 2603 1″, 414 ¾″ and 4211 ⅝″ service cocks and discontinuing 182 ⅝″ and 150 1″, also, setting 86 2″, 40 3″, 25 4″, 12 6″ and 3 8″ sleeves and valves for service	13,076.23
Public drinking fountain set (2)	183.92
Exmaining, repairing and maintaining gates and wells	4,665.67
Repairing leaks and breaks in mains (145)	3,343.30
Attending to service leaks (465)	2,177.20
Responding to false reports of leaks (93)	400.70
Setting gates on old lines	237.2[illegible]

Building wells over gates on old lines	25.55
Opening blow-offs to flush dead end lines	2,551.75
Shutting service connections account leaks and non-payment and letting on same	261.66
Examining fire plants, air chambers, hydraulic elevators, river connections, setting pressure guages and reading pressures	1,520.85
Curing no water and short supply complaints	531.36
Repairing sunken trenches and damaged walks and lawns	370.68
Caring for drinking fountains	709.09
Laying pipe in Atkinson Park, billed to Dept. Parks and Boulevards	652.98
Laying 6" pipe to Fairview Pumping Station, billed to D. P. W.	617.08
Laying 10" pipe to McDougall and Gouin, private property, billed Parke-Davis Co.	1,610.36
Laying 8" pipe to D. P. W. Yard, 19th and Michigan, billed to D. P. W.	959.35
Killing 4" pipe, A. S. Clinton, W. St. Antoine	15.86
Killing 4" pipe, A. S. Michigan, W. Wayne, billed to Harrigan and Reid	36.50
Killing 4" pipe, A. S. Fort, east of Shelby	5.62
Lowering 6" pipe in Phillip, Jefferson to Kercheval	849.08
Lowering 6" pipe in Biddle, Vinewood to McKinley	208.19
Lowering 6" pipe in Parker, Charlevoix to Mack	205.51
Setting 16" gate Park, S. Adams, billed to Ernst Bros	202.68
Setting hydrant at Webb and Oakman Blvd., billed to Robert Oakman	126.62
Yard cartage and expressing to stores	1,437.95
Maintenance of main office building and equipment	213.78
	$50,566.83

SERVICES AND METERS.

There were 7,394 new service taps made during the year and 332 old services were removed, being a net increase of 7,062 services for the year, and making a total of 123,133 services of all sizes in the system. The taps made during the year were of the following sizes:

Size	Installed	Removed	Net Increase
⅝"	4211	182	4029
¾"	414		414
1"	2603	150	2453
2"	86		86
3"	40		40
4"	25		25
6"	12		12
8"	3		3
Total	7394	332	7062

It may be noted that ¾-inch taps were first used here during the past year.

During the year a campaign for metering all services was inaugurated, and in addition to placing meters in all new services, there were over 5,000 set in old service connections. A total of 15,042 meters were set, and 2,913 were removed, resulting in a net increase of 12,130, and making a total of 29,180 meters in service.

The following tabulation gives in detail the number of meters of each size set and removed and the number in service; the cost of testing and installing meters, and a list of the various types in service.

Number of Meters Set, Year Ending June 30, 1915

	⅝"	¾"	1"	1½"	2"	3"	4"	6"	8"	10"	16"	Ind.	Total
In service July 1, 1914..	9982	3287	1979	631	622	246	177	91	5	1	..	30	17051
Set during year ending June 30, 1915..........	7875	5701	1209	111	78	39	20	7	1	..	1	..	15042
Total	17857	8988	3188	742	700	285	197	98	6	1	1	30	32093
Removed during year ending June 30, 1915..	1599	874	379	20	21	14	3	1	1	..	..	1	2913
Net gain	6276	4827	830	91	57	25	17	6	..	..	..	..	12130
Total in service July 1..	16258	8114	2809	722	679	271	194	97	5	1	1	29	29180

Cost of Installing Meters, Year Ending June 30, 1915

Size	Number	Labor and Cartage	Material	Total	Aver. Labor and Cartage	Aver. Material	Aver. Cost
⅝"	6276	$4,769.76	$32,792.10	$37,561.86	$ 0.76	$ 5.22½	$ 5.98½
¾"	4827	2,668.52	37,771.27	41,439.79	0.76	7.82½	8.58½
1"	830	630.80	8,424.50	9,055.30	0.76	10.15	10.91
1½"	91	153.79	1,956.50	2,110.29	1.69	21.50	23.19
2"	57	96.33	1,023.50	1,119.83	1.69	35.50	37.19
*3"	25					62.50	62.50
*4"	17					120.00	120.00
*6"	6					250.00	250.00
†16"	1						
	12,130	$9,319.20	$81,967.87	$91,287.07			

*Set by consumer.

†Set in conjunction with the River Rouge supply main.

Cost of Meter Testing, Year Ending June 30, 1915

Sizes	Number	Flows	Cost	Average
⅝"	6276	Full to 1/16"	$345.18	$ 0.05½
¾"	4827	Full to 1/16"	337.89	0.07
1"	830	Full to 1/16"	66.40	0.08
1½"	99	Full to ⅛"	46.53	0.47
2"	77	Full to ⅛"	36.19	0.47
3"	35	Full to ⅛"	73.50	2.10
4"	25	Full to ⅛"	52.50	2.10
6"	6	Full to ⅛"	12.60	2.10
8"	1	Full to ⅛"	3.36	3.36
16"	1	Full to 1"	13.40	13.40
	12,177		$987.55	

Kind of Meters in Service, Year Ending June 30, 1915

	⅝"	¾"	1"	1½"	2"	3"	4"	6"	8"	10"	16"	Ind.	Total
Crown	1	..	3	..	..	..	..	..	..	..	..	..	4
Hersey Rotary	..	..	7	2	1	..	..	..	..	..	..	..	10
Hersey Detector	..	..	..	..	..	1	8	19	5	1	..	..	34
Hersey Disc "F"	11	5	2	..	..	..	..	..	..	..	..	..	18
Hersey Disc "D"	13	4	..	12	15	5	7	1	..	..	..	..	18
Hersey Torrent	..	..	..	..	..	5	3	3	..	..	..	..	11
Worthington Piston	..	1	2	..	1	1	1	..	..	..	..	..	6
American	33	11	7	6	2	..	..	..	..	..	..	..	59
Keystone	28	8	5	3	2	..	2	..	..	..	..	..	48
King	21	5	2	2	3	..	..	..	..	..	..	..	33
Gamon	1853	211	83	36	35	..	..	..	..	..	..	..	2218
Worthington	6158	3274	1026	130	129	56	52	31	..	..	..	..	10856
Thomson	4550	1676	1409	498	468	194	117	42	..	..	..	..	8954
Nash	3590	2919	262	33	22	9	2	..	..	..	..	..	6837
Nilo	..	..	..	..	1	..	1	..	..	..	..	..	2
Eureka	..	..	..	..	..	..	1	1	..	..	..	..	2
Indicator	..	..	..	..	..	..	..	..	..	..	..	29	29
Neptune	..	1	..	..	..	..	..	..	..	..	..	..	1
Crest Trident	..	..	..	..	..	..	..	..	..	..	1	..	1
	16258	8114	2809	722	679	271	194	97	5	1	1	29	29180

PUMPING STATION AND GROUNDS.

In the new Pumping Station, the few minor matters which were unfinished at the end of last year have all been completed. The heating system was installed, the lower floor completed, and the lighting fixtures put in, in accordance with contracts, and the interior of the concrete roof was painted. The old station and the stand pipe tower were painted on the exterior, and the doorways of the Station and boiler house were remodeled.

The coal crusher which was contracted for early in 1914 was erected in July, and has worked very successfully throughout the past season.

The canal or slip in the Pumping Station grounds where the coal boats enter for unloading was dredged out to a uniform depth of 14 feet; about 3,000 cubic yards of material was removed at an approximate cost of 40 cents per cubic yard. The dredging material had to be removed in scows and dumped east of the dock.

The new greenhouse, the contract for which was let in July, 1914, was completed in December, 1914.

Considerable work was done in the laying out of roads and walks, and draining, grading and sodding in the grounds around the new Pumping Station and the laying of water mains for the sprinkling system, and the railroad siding on the easterly edge of the grounds was relaid in a new location.

A large Air Chamber was installed in connection with Pumping Engine No. 4, resulting in much better operation of this engine.

Plans were prepared for four screen houses and one chlorination house designed for the betterment of the water supply and its treatment, and a contract was let for the installation of a liquid chlorine apparatus to take the place of the present Hypochlorite treatment.

The work on the foundation of the Chlorination house was started in May, 1915, and work is still in progress on this structure.

Pumpage—Recorded by Venturi Meters

	HIGH SERVICE		LOW SERVICE		TOTAL	
Month	Total Gallons	Daily Average Gallons	Total Gallons	Daily Average Gallons	Total Gallons	Daily Average Gallons
July,	1,416,992,189	45,709,425	2,625,654,491	84,698,532	4,042,646,680	130,407,957
Aug.	1,422,465,919	45,885,997	2,585,890,602	83,415,826	4,008,356,521	129,301,823
Sept.	1,335,997,791	44,533,260	2,428,804,922	80,960,164	3,764,802,713	125,493,424
Oct.	1,342,571,219	43,308,749	2,398,339,220	77,365,781	3,740,910,439	120,674,530
Nov.	1,241,527,531	41,384,251	2,071,555,484	69,051,849	3,313,083,015	110,436,100
Dec.	1,306,702,016	42,151,678	2,368,136,621	76,391,504	3,674,838,637	118,543,182
Jan.,	1,336,238,506	43,104,468	2,572,347,578	82,978,954	3,908,586,084	126,083,422
Feb.	1,219,215,058	43,543,395	2,299,102,332	82,110,798	3,518,317,390	125,654,193
Mar.	1,288,439,632	41,562,569	2,296,229,551	74,071,921	3,584,669,183	115,634,490
Apr.	1,335,362,586	44,512,086	2,221,295,703	74,043,190	3,556,658,289	118,555,276
May	1,384,223,533	44,652,372	2,321,761,018	74,895,517	3,705,984,551	119,547,889
June	1,459,214,951	48,640,498	2,311,355,440	77,045,181	3,770,570,391	125,685,680
Year	16,088,950,930	44,079,317	28,500,472,968	78,083,488	44,589,423,893	122,162,805

NEW AND PROPOSED WORK.

As noted under pipe system, the work of laying the larger distributing mains has been under progress during the past year, and this work will be pushed to completion as rapidly as possible.

The thirty-six-inch main on Twelfth Street, from the Boulevard North, should be extended eventually as far as the Belt Line Railroad, with twenty-four-inch connections running westwardly therefrom, on Clairmont Avenue and Joy Road, and on or about Glendale Avenue, to make connection finally with the sixteen-inch main on Grand River Avenue, and the sixteen-inch main on Grand River Avenue should be extended also.

The twenty-four-inch main from Sylvester and the East Grand Boulevard, to Canfield and Elmwood Avenue, recommended in last year's report, should be laid during the coming year.

With the exception of the larger lines now under construction it is not probable that any 48-inch or 42-inch mains will be required for the next year.

Accompanying this report is a summary of statistics in form recommended by the New England Water Association, which gives in succinct form the salient facts regarding the water works system and its operation.

Very respectfully,

THEODORE A. LEISEN,
General Superintendent.

SUMMARY OF STATISTICS

In form recommended by the New England Water Works Association.

Detroit Water Works,
Detroit, Wayne County, Michigan.

GENERAL STATISTICS.

Population by United States Census of 1910, 465,766.

Date of construction, 1827.

By whom owned. The Board of Water Commissioners of the City of Detroit.

Source of supply, Detroit River, near Lake St. Clair.

Mode of supply, pumping.

PUMPING STATISTICS.

Builders of pumping machinery—

- One 24,000,000 gallon, Compound Beam, Detroit Locomotive Works, Detroit, Michigan.
- One 24,000,000 gallon, Compound Beam, Riverside Engine Works, Detroit, Michigan.
- One 30,000,000 gallon, Compound Beam, Riverside Engine Works, Detroit, Michigan.
- One 24,000,000 gallon, Triple Expansion, E. P. Allis & Co., Milwaukee, Wis.
- Two 25,000,000 gallon, Triple Expansion, Allis Chalmers Co., Milwaukee, Wis.
- One 25,000,000 gallon, Triple Expansion, Holly Mfg. Co., Buffalo, N. Y.
- Three 30,000,000 gallon, Triple Expansion, Bethlehem Steel Co., South Bethlehem, Pa.

Description of fuel used—

a. Kind, bituminous, run of mine.
b. Brand of coal, Meadowbrook, W. Va.
c. Average price of coal, per gross ton (2,240 lbs.) delivered at Water Works $2.82

d. Percentage of ash, from Laboratory Analyses..............6.7%

e. Wood, price per cord, none used.

Coal consumer for the year, 47,878,610 lbs.

Amount of other fuel used, none.

Total pumping for the year—

High Service	16,088,950,930	gallons
Low Service	28,500,472,963	gallons
Total	44,589,423,893	gallons

An allowance of 3% slip for all engines has been made in these quantities, and they represent the actual metered consumption.

Average static head against which pumps work—

High Service	64.7 lbs.,	149.6 ft.
Low Service	47.1 lbs.,	108.7 ft.
Whole System	53.4 lbs.,	123.5 ft.

Number of gallons pumped per pound of equivalent coal, 931.

$$\text{Duty} = \frac{\text{Gallons pumped x 8.34 (lbs.) x 100 x dynamic head}}{\text{Total Fuel Consumed.}} = 95{,}922{,}969$$

Cost of pumping, figured on pumping station expenses, $138,949.04.

Per million gallons pumped, $3.12.

Per million raised one foot (dynamic), $0.025.

STATISTICS OF CONSUMPTION OF WATER.

Estimated total population at date (City of Detroit)	678,746
Estimated population on lines of pipes	753,046
Estimated population supplied	753,046
Total consumption for the year	44,589,423,893 gallons
Passed through meters	19,634,913,490 gallons
Percentage of consumption metered	44.0%
Average daily consumption	122,162,805 gallons
Gallons per day to each inhabitant	162.0
Gallons per day to each consumer	162.0
Gallons per day to each tap	992
Cost of supplying water, per million gallons, figured on total maintenance	$4.91
Total cost of supplying water, per million gallons, figured on total maintenance plus interest on bonds	$6.53

STATISTICS RELATING TO DISTRIBUTION SYSTEM.

MAINS.

Kind of pipe, cast iron.

Sizes, from 2-inch to 48-inch.

Extended during year	222,448 feet	42.14 miles
Discontinued during year	14,047 feet	2.66 miles
Total now in use	5,050.930	956.62 miles
Cost of repairs per mile		$3.50
Number of leaks per mile		0.15
Length of pipes less than 4 inches diameter		10.43 miles
Number of hydrants (public) added during the year		303
Number of hydrants (public) now in use		6,750
Number of cisterns now in use		518
Number of stop gates added during year		353
Number of stop gates now in use		10,579
Number of blow-offs		723
Number of stop gates smaller than 4 inch		27

Range of pressure on mains, 16 lbs. to 79 lbs.

SERVICES.

Kind of pipe, lead and cast iron.

Sizes, ⅝-inch to 12-inch.

Number of service tops added during year	7,062
Number now in use	123,133

Average length of service, approximately 30 feet.

Number of meters added	12,130
Number now in use	29,180
Percentage of services metered	23.6%
Percentage of receipts from metered water	50.6%

FINANCIAL STATISTICS.

RECEIPTS.

Assessment rates	$683,800.80	
Meter rates	701,534.53	
Delinquent, etc.	9,209.98	
Total from consumers		$1,394 545.31
Miscellaneous receipts	$128,903 85	
Interest	9,548.56	
		138,440.62
		$1,532,985.93

EXPENDITURES.

Water Works Maintenance—		
Operation, management and repairs	$218,888.14	
Interest on bonds	72,845.00	
	$291,773.14	
Depreciation account	146,785.96	$ 438,519.10
Balance		$1,094,466.83
Disposition of balance, devoted to construction work—		
Valuation of works		$11,971,572.91
Value of real estate		863,128.43
Bonded debt		1,947,000.00
Amount of Sinking Fund		94,284.36
Average rate of interest		3½%

ROLL OF COMMISSIONERS AND THEIR TENURE OF OFFICE

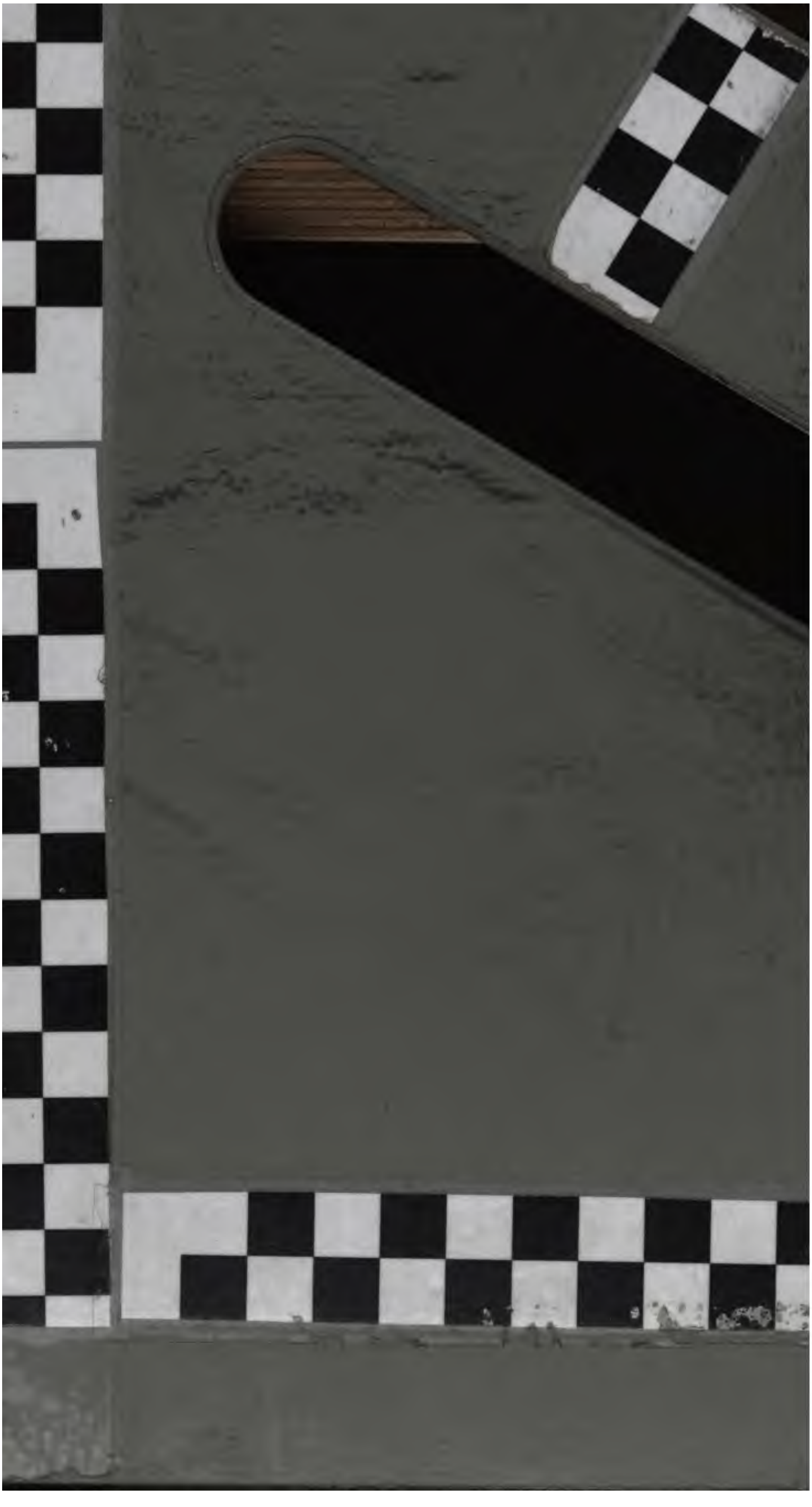
James A. Van Dyke	1853	1855	Died.
Edmund A. Brush	1853	1868	Resigned.
Henry Ledyard	1853	1859	Resigned.
Shubael Conant	1853	1859	May 1st.
William R. Noyes	1853	1865	Resigned.
Alexander D. Frazer	1855	1871	May 1st.
Julius D. Morton	1859	1865	Died.
John V. Ruehle	1859	1861	Resigned.
Chauncy Hurlbut	1861—1863	1868—1885	Died.
Stanley G. Wight	1863	1868	May 1st.
Jacob S. Farrand	1865	1890	May 1st.
John Owen	1865	1879	May 1st.
Caleb Van Husan	1868	1872	May 1st.
Samuel F. Hodge	1871	1879	Resigned.
Elijah Smith	1872	1877	May 1st.
Michael Martz	1877	1887	May 1st.
James Beatty	1879	1885	Died.
John Pridgeon	1879—1884	1886—1891	May 1st.
Marshall H. Godfrey	1884	1889	Resigned.
Edwin F. Conley	1885	1886	May 1st.
Samuel G. Caskey	1885	1895	May 1st.
Joseph Nagel	1887	1890	Died.
August Goebel	1889—1894	1897—1898	Resigned.
Henry M. Duffield	1890	1895	May 1st.
Joseph L. Hudson	1890	1894	May 1st.
Frank E. Kirby	1891	1896	May 1st.
Albert L. Stephens	1894	1897	May 1st.
D. W. H. Moreland	1894	1896	Resigned.
Clarence A. Black	1894	1894	Resigned.
Edward W. Pendleton	1894	1909	May 1st.
Darius D. Thorp	1895	1905	May 1st.
John P. Huckestein	1896	1897	Resigned.
John W. McGrath	1896	1901	May 1st.
Joseph J. Noeker	1898	1902	May 1st.
James W. Millen	1897	1898	May 1st.
James Meathe	1898	1899	Died.

ROLL OF COMMISSIONERS—*Continued*

Benjamin Guiney	1899	1900	Resigned.
John Zynda	1900	1908	May 1st.
Joseph J. Crowley	1901	1906	May 1st.
John Schroder	1902	1907	May 1st.
John F. Dodge	1905	1910	May 1st.
Frederick J. Clippert	1906	1911	May 1st.
James H. Pound	1907	1912	Resigned.
Basil A. Lemke	1908	1913	May 1st.
James Wilkie	1909	1914	May 1st.
John Gillespie	1910	1913	Resigned.
Thomas F. Comerford	1913	1914	Resigned.

MEMBERS OF THE BOARD, 1914-1915.

JAMES J. BRADY
GEO. LANE
EMIL STROH
BENJ. F. GUINEY
ROBERT OAKMAN



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The SIXTY-FOURTH
NNUAL REPORT
f the Board of Water
ommissioners of
he City of Detroit

or the Year Ending
June 30th, 1916

President, JAMES J. BRADY

SIXTY-FOURTH ANNUAL REPORT

OF THE

BOARD *of* WATER COMMISSIONERS

OF THE CITY OF DETROIT

TO THE

COMMON COUNCIL *of* THE CITY *of* DETROIT

TOGETHER WITH THE REPORTS OF
THE OFFICERS OF THE BOARD

FOR THE YEAR ENDING
JUNE 30, 1916

DETROIT
THOS. SMITH PRESS
1917

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BOARD *of* WATER COMMISSIONERS *of* THE CITY OF DETROIT

MEMBERS

JAMES J. BRADY, 1917	BENJ. F. GUINEY, 1919
ROBERT OAKMAN, 1918	EMIL STROH, 1920

ALEX. DOW, 1921

COMMITTEES

Ways and Means	Commissioners OAKMAN and STROH
Extension and Construction	Commissioners STROH and OAKMAN
Water Works Park	Commissioners DOW and GUINEY
Supplies	Commissioners GUINEY and DOW

The President is ex-officio member of each committee.

OFFICERS

President	JAMES J. BRADY
Vice-President	ROBERT OAKMAN
Secretary	H. A. GILMARTIN
General Superintendent	THEODORE A. LEISEN
Purchasing Agent and Paymaster	H. S. STARKEY
Auditor	J. W. LOEFFLER
Chief Engineer at Pumping Station	HARRY W. GOULD
Bookkeeper	GEORGE BARRIE
Cashier	D. C. GROBBEL
Permit Clerk	LOUIS MONTGOMERY
Chief Clerk, Rate Department	WALTER C. BOWEN
Chief Clerk, Meter Department	CHAS. F. GILMER

BOARD *of* WATER COMMISSIONERS
of THE CITY OF DETROIT

From July 1st, 1909

METER RATES

Payable Quarterly

	Quarterly
First 2,000 cubic feet per quarter, minimum charge	**90 cts.**
Next 2,000 cubic feet	**44 88/100 cts. per M.**
All additional	**22 44/100 cts. per M.**
Double rates outside of city.	
Minimum rate for terraces and apartments—	
First	**90 cts.**
Each additional	**45 cts.**

ASSESSMENT RATES

	Per Annum
For family, household purposes, each family	**$3 00**
Private stable, for each horse	**1 20**
Livery stable, for each horse	**1 20**
Dray and team horses, each	**1 00**
Cows, each	**1 00**
Boarding houses, in addition to family rate, each boarder or roomer	**40**
Estimated quantities of water, each 1,000 gallons	**07**
Automobiles, each	**1 20**
Bath tub, for families, each	**1 00**
" public, each tub	**4 00**
Automatic water closets, for family, 1st closet	**1 60**
" " " each additional	**60**
Rod water closets, not less than	**6 00**
Urinals, not less than	**2 00**
Wash hand basin, for family, each	**50**
" " " for other purposes, each person	**15**
Hose bibb or connection, premises 30 feet front or less	**1 00**
" " " " 30 feet to 60 feet	**1 40**
" " " " 60 feet to 100 feet	**2 00**
Special rates for larger grounds.	
Fountains	**$10 00 to 20 00**
Street sprinklers, each wagon	**50 00**

WATER RATES
for
BUILDING and CONSTRUCTION PURPOSES

Brick	**5c** per M.
Plaster	**7c** per 100 Sq. Yds.
Concrete	**$1.00** per 100 Cu. Yds.
" 6" thick or less	**20c** per 100 Sq. Yds.
Tile	**5c** per 100 Cu. Ft.
Each perch stone	**1c**

	No Basement	Complete Basement
One story frame	**$ 50**	**$ 75**
Two story frame	**75**	**1 00**
One story brick	**75**	**1 00**
Two story brick	**1 00**	**1 25**
Two family frame	**1 00**	**1 50**
Two family brick	**1 50**	**2 00**

Where there is a waste of water an increase of rates will be made.

ANNUAL REPORT *of* THE BOARD *of* WATER COMMISSIONERS *of* THE CITY OF DETROIT

July 1, 1915, to June 30, 1916

TO THE HONORABLE
The Common Council of the City of Detroit.

Gentlemen:—

The Board of Water Commissioners of the City of Detroit respectfully presents its annual report for the fiscal year ending June 30, 1916.

The total receipts for the year were $1,744,905.40, and the total disbursements were $1,769,572.26. The total pumpage for the year was 46,688,949,000 gallons, an increase of 4.7% over that of the previous year. The average daily consumption of water was 127,565,434 gallons, equal to a daily per capita consumption of 163 gallons, based on a population of 781,133.

During the year 49.18 miles of new water mains were completed, including one forty-eight and one forty-two inch supply mains. The work of metering all service connections has been going forward steadily during the year, and on June 30, 1916, there were 46,991 meters in service.

Respectfully submitted,

JAMES J. BRADY,
ROBERT OAKMAN,
BENJ. F. GUINEY,
EMIL STROH,
ALEX. DOW,
Commissioners.

H. A. GILMARTIN,
Secretary.

FINANCIAL STATEMENT

July 1, 1915—			
Cash on hand			$ 9,887.65
Cash in bank—			
General Fund		$279,889.50	
Sinking Fund		94,284.36	
Secretary Fund		1,000.00	
Hurlbut Fund		830.04	
			$ 376,003.90
			$ 385,891.55
Receipts for year ending June 30, 1916			$1,744,905.40
			$2,130,796.95
Disbursements for year ending June 30, 1916			$1,769,572.26
Balance—			
Cash on hand		$ 5,076.34	
Cash in bank—			
General Fund	$292,953.60		
Outstanding checks	39,457.65		
		$253,495.95	
Sinking Fund		100,115.58	
Hurlbut Fund		1,536.82	
Secretary Fund	923.00		
Outstanding checks	127.35		
	$ 795.65		
Cash on hand	204.35		
		$ 1,000.00	
			$ 361,224.69

FIRST AND OLD DETROIT NATIONAL BANK

BOARD OF WATER COMMISSIONERS
Detroit, Michigan.

Gentlemen:—

This is to certify that the balance standing to your credit on our books at the close of business June 30th, 1916, was:

General Fund	$292,953.60
Secretary Fund	923.00
Hurlbut Fund	1,536.82
Sinking Fund	100,115.58
Total	$395,529.00

Yours very truly,

JAMES A. WILSON,
Assistant Cashier.

Cost of Water Service Operations for the Year Ending June 30th, 1916

Pumped per Meters at Pumping Station, 46,688,449,000 gals.

			Per Million Gallons
PRODUCTION COST			
Collection and Purification Cost:			
Operation of intake system	$ 706.43		
Chemical treatment	16,593.98		
Maintenance of collection and purification plant	25,320.68		
Depreciation of collection and purification plant	7,859.20		
Direct cost of collection and purification plant		$ 50,480.29	$ 1.08
Steam Power Cost			
Fuel for pumping	$61,417.38		
Wages for firemen and helpers	27,829.99		
Boiler house supplies	13.43		
Maintenance of steam power plant and buildings	2,470.90		
Depreciation of steam power plant and buildings	8,068.44		
Direct steam power cost		99,800.14	2.13
Cost of Operating Pumps:			
Wages of assistant engineers and helpers	$37,159.13		
Oils, waste and supplies	3,424.56		
Maintenance of pumping plant and buildings	1,453.00		
Depreciation of pumping plant and buildings	28,416.32		
Direct cost of operating pumps		70,453.01	1.51
Superintendence and general expense		3,843.83	.08
Proportion of Overhead Expense:			
Proportion of engineering department expense	$ 6,199.86		
Proportion of administration and general expense	496.61		
Total proportion of overhead expense		6,696.47	.14
Total cost of water delivered to mains		$231,273.74	$ 4.95
DISTRIBUTION COST			
Distribution System Cost:			
Repairing main leaks	$ 5,140.14		
Repair and maintain gates and wells	8,152.48		
Flush mains and blow off dead ends	2,348.88		
Repair trenches, walks and lawns	1,487.89		
Depreciation of water mains, gates and wells	96,818.12		
Depreciation of emergency station	209.80		
Direct distribution costs		$114,157.31	$ 2.45

Service Costs:			
Repair service leaks	$ 1,447.86		
Repair and maintain drinking fountains	1,256.01		
False reports of leaks	176.50		
No water and short supply	710.81		
Shut off and let on	265.70		
Miscellaneous inspection expense	2,138.12		
Total direct distribution cost		5,995.00	.13
Total direct distribution cost		$120,152.31	$ 2.58
Proportion of overhead expense:			
Proportion of general yard expense	$16,116.57		
Proportion of engineering expense	6,204.17		
Proportion of administration and general expense	53,597.28		
Total proportion of overhead expense		75,918.02	1.62
Total distribution costs		$196,070.33	$ 4.20

METER SERVICE COSTS

Meter Department Costs:			
Repair and maintain meters	$ 8,333.12		
Remove and replace meters	2,198.29		
Depreciation of meters	5,414.08		
Direct meter cost		$ 15,945.49	$ .34
Proportion of Overhead Expense:			
Proportion of storage yard expense	$ 3,264.84		
Proportion of administration and general expense	37,089.19		
Total proportion of overhead expense		40,354.03	.86
		$ 56,299.52	$ 1.20

SUMMARY

Total cost of water delivered to mains	$231,273.74	$ 4.95
Total distribution cost	196,070.33	4.20
Total cost of water pumped and delivered	$427,344.07	$ 9.15
Total meter cost	56,299.52	1.20
Total cost	$483,643.59	$10.35

CONSTRUCTION REPORT

Year Ending June 30th, 1916

Work in process July 1, 1915		$ 406,850.53
Pay Roll	$ 349,228.08	
Materials	609,617.25	
Cartage	12,476.93	
		$ 971,322.26
Overhead expense—		
Storage yard expense	37,488.69	
Engineering Dept. Expense	24,451.77	
Administration and general expense	8,673.31	
		$ 70,613.77
Extending meter service—		
Labor and materials	$ 105,028.71	
Overhead expense—		
Storage yard expense	$ 4,990.60	
Administration and general expense	4,341.42	
		114,360.73
		$1,563,147.29
Completed Work Transferred to Plant Accounts—		
Water mains, gate and wells	$ 905,906.33	
Collection and purification plant	687.24	
Steam power plant	740.95	
Pumping plant, No. 2	5,901.37	
Water works park improvements	9,474.26	
Meters in service	114,360.73	
	$1,037,070.88	
Maintenance collection and purification system	$ 19,885.76	
Maintenance buildings, fences and equipment, Water Works Park	1,417.52	
		$1,058,374.16
Work in process June 30, 1916		$ 504,773.13

NET REVENUES

Year Ending June 30th, 1916

Water Service Operations—		
Assessment rates	$ 615,034.31	
Meter rates	784,126.45	
Shutting off and letting on	469.91	
Percentage on delinquent accounts	8,135.80	
Total revenue from water service	$1,407,766.47	
Cost of water service operations	483,643.59	
Net gain from water service operations		$ 924,122.88
Miscellaneous Revenues—		
Estimates paid for pipe lines	$ 112,555.62	
Sales of work and material	3,693.63	
Bonuses paid for pipe lines	6,912.50	
Meter bonuses	5,878.20	
Service extensions	24.90	
Miscellaneous	3,606.94	
Interest earned on general fund	10,213.67	
Interest earned on sinking fund	3,553.72	
Plumbers licenses	1,067.50	
Service connections	8,988.35	
		$ 156,495.03
City of Detroit general tax levy	$ 75,000.00	
Interest on bonded indebtedness	72,845.00	
		$ 2,155.00
Income from the trustees of the Hurlbut fund		$ 4,852.18
		$1,087,625.09
Water Works Park expense		$ 24,823.19
Net gain for year ending June 30, 1916		$1,062,801.90

BALANCE SHEET

Year Ending June 30th, 1916

ASSETS.

Current Cash and Bank Accounts:	
Current cash ....$	5,076.34
Cash in Bank:	
General Fund	253,495.95
Hurlbut Fund	1,536.82
Secretary's Fund, bank balance and cash on hand...	1,000.00
Total cash and bank accounts ....$	261,109.11
Accounts Receivable:	
Meter rates ....$	81,982.33
Assessment rates	3,149.36
Miscellaneous accounts receivable	7,030.42
Total accounts receivable.$	92,162.11
Inventories:	
Stores and supplies at yard...$	166,952.33
Coal at pumping station......	19,488.85
Construction work in process.	504,773.13
Equipment	109,556.74
Total inventories ....$	800,771.05
Plants:	
Collection and purification plant ....$	554,741.72
Steam power plant...........	297,499.95
Pumping plant No. 1........	1,016,705.23
Pumping plant No. 2........	1,001,036.13
Water mains, gate and wells.	11,540,497.30
Meters in service............	446,757.34
Public drinking fountains.....	8,981.45
Storage yards buildings and improvements	84,759.38
Emergency station	15,723.91
Main office building.........	54,288.00
Water Works Park improvements	153,344.12
Proposed filtration plant......	426.16
	$15,174,760.69
Less reserve for depreciation...	2,315,046.50
Present value of plants...$	12,859,714.19
Real estate	863,128.43
Sinking Fund	100,115.58
Total ....$	14,977,000.47

LIABILITIES, ETC.

Current Liabilities:	
Vouchers payable ....$	83,052.53
Interest accrued on bonds....	23,010.97
1915-16 assessment	18,821.36
Accrued payroll, storage yard	469.83
Total current liabilities...$	125,354.69
Special Liabilities:	
Liabilities to injured workmen ....$	3,197.62
Bonded Indebtedness: Total liabilities ....$	1,947,000.00
Reserve:	
Sinking Fund ....$	100,115.58
Hurlbut Fund	1,536.82
Total reserve ....$	101,652.40
Surplus ....$	12,799,795.76
	$14,977,000.47

BONDED INDEBTEDNESS

The following table shows the dates of issue and amount of bonds of this department outstanding at this date. The total amount issued by the Board during its existence is $3,990,000, of which $300,000 were refunded and $1,743,000 redeemed, leaving a balance due of $1,947,000.

Act				Rate of Int.	Redeemed Refund	Out-standing
1873	Jan. 10, 1895	Jan. 10, 1925	$ 100,000	4%		$ 100,000
1869	Feb. 1, 1900	Feb. 1, 1930	200,000	3½%	$ 20,000	180,000
1873	Jan. 1, 1903	Jan. 1, 1933	50,000	3½%		50,000
1873	Sept. 1, 1903	Sept. 1, 1933	150,000	3½%		150,000
1901	June 1, 1904	June 1, 1934	200,000	3½%		200,000
1901	Aug. 1, 1904	Aug. 1, 1919	100,000	4%		100,000
1901	Feb. 1, 1905	Feb. 1, 1935	150,000	3½%		150,000
1901	Aug. 1, 1908	Aug. 1, 1938	250,000	3½%	75,000	175,000
1901	July 1, 1909	July 1, 1939	200,000	3½%	98,000	102,000
1901	Oct. 1, 1912	Oct. 1, 1932	240,000	4%		240,000
1913	Mar. 1, 1914	Mar. 1, 1944	500,000	4%		500,000
			$2,140,000		$193,000	$1,947,000

REPORT OF THE GENERAL SUPERINTENDENT

TO THE BOARD OF WATER COMMISSIONERS OF
THE CITY OF DETROIT:

Gentlemen:—I submit herewith the annual report of the Engineering, Construction, and Operating Departments for the fiscal year ending June 30, 1916, giving a general statement of the results accomplished by these branches of the service, and embracing tabulations and other detailed information relative to the pumpage records, and work on the distribution system.

PUMPAGE AND DISTRIBUTION

The statements of water pumped are based on meterage records as registered by the Venturi Meters, and differ from the pumpage quantities calculated by plunger displacement by approximately three per cent, this difference representing the combined amount of pump slippage and unmetered water used at the pumpage station and surrounding grounds.

The total pumpage for the year amounted to 46,688,949,000 gallons, of which 33,820,674,000 gallons represented the low service, and 12,868,275,000 gallons the high service consumption. The pumpage for the current year showed an increase of 4 7/10 per cent over the previous year's record, as compared with an increase of 3 7/10 per cent of population served, the low rate of increase in the latter instance being due to the inclusion of Highland Park in the territory served during the previous year, whereas during the full period of the current year it maintained an independent water supply system.

The average daily consumption of water was 127,565,434 gallons, equivalent to a daily per capita consumption of 163 gallons, based on a population of 781,133 for Detroit and the environs supplied by the Detroit system. The exclusion of Highland Park as a factor in the records of consumption and population, creates a condition which makes a comparison between the two years somewhat indeterminate.

The number of meters in service connections was increased from 29,180 in 1915 to 46,991 in 1916, and the total quantity of water furnished through these meters was 24,632,229,930 gallons or 52.7 per cent. of the total consumption, producing 56.0 per cent. of the revenue derived from the sale of water.

The water consumed for industrial purposes, which represents that used by manufacturing industries, railroads, hotels and other business enterprises, amounted to 16,340,000,000 or 35.0 per cent. of the total consumption. The remaining quantity, amounting to 30,348,949,000 gallons, which may be classified as purely domestic consumption, but which of necessity included all water used for sprinkling and flushing streets, fire protection, and all incidental leakage, is equivalent to a per capita consumption of 106 gallons per day.

The rate of maximum consumption was reached on January 17, 1916, when the pumpage for one hour was at the equivalent rate of 192,854,400 gallons per day or 51 per cent. above the average daily rate. The minimum rate of pumpage occurred on May 27, 1916, with an equivalent daily rate of 72,000,000 gallons.

The reports from the Fire Department during the past year indicate a total consumption of 21,630,000 gallons for fire protection purposes, or one-twentieth of one per cent. of the total quantity pumped. The following tables give the maximum and minimum figures, and other details of pumpage as indicated both by plunger displacement and metered measurement, and a statement of the high and low service pumpage, showing both monthly quantities and daily averages.

COMPARISON OF METER AND PUMP RECORDS

	Meter Measurement	Plunger Displacement
Maximum day, June 18, 1916	158,450,000	164,087,770
Minimum day, Nov. 21, 1915	98,550,750	101,015,940
Average daily (entire system)	127,565,434	131,654,068
Average daily (high service)	35,159,221	36,285,898
Average daily (low service)	92,406,213	95,368,170
Total for year	46,688,949,000	48,185,389,000
Maximum hour (entire system), Jan. 17, 1916, 10 A. M. to 11 A. M.	8,035,600	8,293,100
Maximum hour (high service),	2,032,500	2,097,630
Maximum hour (low service)	6,003,100	6,195,470
Minimum hour (entire system), May 27, 1916, 3 A. M. to 4 A. M.	3,001,250	3,097,430
Minimum hour (high service)	1,027,500	1,060,426
Minimum hour (low service)	1,973,750	2,037,004

Rate per day at maximum hour (entire system)	192,854,400	199,034,400
Rate per day at maximum hour (high service)	48,780,000	50,343,120
Rate per day at maximum hour (low service)	144,074,400	148,691,280
Rate per day at minimum hour (entire system)	72,030,000	74,338,320
Rate per day at minimum hour (high service)	24,660,000	25,450,224
Rate per day at minimum hour (low service)	47,370,000	48,888,096

PUMPAGE

Recorded by Venturi Meters

	HIGH SERVICE		LOW SERVICE		TOTAL	
Month 1915	Total Gallons	Daily Average Gallons	Total Gallons	Daily Average Gallons	Total Gallons	Daily Average Gallons
July	1,075,575,000	34,695,968	2,850,150,500	91,940,339	3,925,725,500	126,636,307
Aug.	1,080,725,000	34,862,097	2,861,236,500	92,297,952	3,941,961,500	127,160,049
Sept.	1,066,720,000	35,557,333	2,820,937,000	94,031,233	3,887,657,000	129,588,566
Oct.	1,049,970,000	33,870,000	2,700,776,250	87,121,814	3,750,746,250	120,991,814
Nov.	986,330,000	32,877,667	2,500,116,000	83,337,200	3,486,446,000	116,214,867
Dec.	1,028,755,000	33,185,645	2,651,205,000	85,522,742	3,679,960,000	118,708,387
1916						
Jan.	1,073,335,000	34,623,710	2,839,719,000	91,603,839	3,913,054,000	126,227,549
Feb.	1,083,745,000	37,370,518	2,910,087,500	100,347,845	3,993,832,500	137,718,363
Mar.	1,143,605,000	36,890,484	3,062,623,000	98,794,290	4,206,228,000	135,684,774
Apr.	1,050,197,500	35,006,583	2,769,300,500	92,310,017	3,819,498,000	127,316,600
May	1,122,415,000	36,206,935	2,926,474,000	94,402,387	4,048,889,000	130,609,322
June	1,106,902,500	36,896,750	2,928,048,750	97,601,625	4,034,951,250	134,498,375
Year	12,868,275,000	35,190,972	33,820,674,000	92,374,462	46,688,949,000	127,565,434

The division of the water consumption and population in Detroit and adjacent suburbs is shown in the accompanying tabulation, and it may be noted that the total quantity of water delivered outside of the city was only three and one-half per cent. of the total pumpage.

CONSUMPTION OF WATER IN DETROIT AND VILLAGES

	Total Consumption Gallons	Daily Average Gallons	Estimated Population
Detroit unmetered	21,756,719,070	59,444,587	
Detroit metered	23,256,418,530	63,542,127	
	45,013,137,600	122,986,714	734,562
River Rouge, metered	271,143,000	740,828	6,000
Ecorse, metered	70,585,500	192,857	2,500
Hamtramck, metered	964,701,000	2,635,795	25,000
Oakwood, metered	45,513,800	124,355	1,271

Grosse Pointe, metered..........	23,868,100	65,213	1,800
Greenfield and unmetered suburbs, including St. Clair Heights, estimated	300,000,000	819,672	10,000
Villages, total	1,675,811,400	4,578,720	46,571
Detroit, total	45,013,137,600	122,986,714	734,562
Total	46,688,949,000	127,565,434	781,133
Total, unmetered	22,056,719,070	60,264,259	
Total, metered	24,632,229,930	67,301,175	
Total pumpage	46,688,949,000	127,565,434	

The operations at the pumping stations, show an average station duty of 94,200,000 foot-pounds per 100 lbs. of coal burned for all of the pumping engines, with all steam used for heating surrounding buildings, and for operating portable pumps in cleaning the settling basin charged against the station. The actual cost of operating the pumping stations, and the average cost per million gallons is shown in the following table.

Cost of Pumpage

	Total Cost	Cost per Million Gallons	Cost per Million Gallons Raised 100 ft.
Labor	$ 68,832.95	$1.47	$1.21
Fuel	61,417.38	1.32	1.09
Oil and supplies.............	3,437.99	.07	.06
Miscellaneous	3,923.90	.08	.07
Total.................	$137,612.22	$2.94	$2.43

QUALITY OF WATER

The quality of the water has been fairly good throughout the year, although considerable difficulty was experienced in January and February, 1916, in the efforts to destroy the colon bacillus by means of sterilization. The river water showed evidence of B. Coli in 1574 out of 3450 samples of 10 cubic centimetres each or 45 per cent., equivalent to an average of 14.40 B. Coli per 100 c. c. The treated water showed the presence of B. Coli in 218 out of 3460 tests of 10 c. c. each or 6 per cent., equivalent to 1.06 B. Coli per 100 c. c. Phelps method. The relatively high average count in the treated water was due to the high contents in January and February, these two months giving 95 in 285 and 80 in 260 samples respectively.

From July 1, 1915, to January 14th, 1916, the water supply was treated exclusively with calcium hypochlorite, and from the latter date to March 10, 1916, during the period when the liquid chlorine apparatus was being installed, both calcium hypochlorite and chlorine gas were used. From March 10 to the end of the fiscal year chlorine gas was used exclusively, except for four days in June, when owing to shortage of shipment of liquid chlorine, hypo was substituted. The quantity of liquid chlorine used varied from 1.5 to 2.5 pounds per million gallons of water treated, and the average cost of the treatment was approximately 36 cents per million gallons.

Daily bacterial analyses of the River Water, and Treated Water, show the following results:

Average number of Bacteria per c. c.:

Gelatine at 20 deg.	River Water,	187.6;	Treated Water	14.5
Agar at 37 deg.	River Water,	26.3;	Treated Water	11.2
Agar at 20 deg.	River Water,	187.2;	Treated Water	15.1

RIVER WATER—

B. Coli in 1 C. C. sample—positive on 69 days—81 times in 690 tests.

B. Coli in 10 C. C. samples—positive on 283 days—1574 times in 3450 tests.

TREATED WATER—

B. Coli in 1 C. C. sample—positive on 4 days—4 times in 692 tests.

B. Coli in 10 C. C. samples—positive on 72 days—218 times in 3460 tests.

Presumptive tests—July 1, 1915, to February 29, 1916.

Confirmed tests—March 1, 1916, to June 30, 1916.

The accompanying table gives a monthly resumé of the bacterial analyses of the River and treated water. (See tabulation.)

WATER PRESSURE

The general pressure throughout both the low and high service systems has shown a greater uniformity, although a very slight increase on the average as compared with the preceding year. Where recording gauges have been maintained, a very satisfactory degree of stability and uniformity of pressure has been evidenced, indicating an improvement over previous conditions without any material increase in pressure at the Pumping Station. The tabulation of pressures recorded at the various fire engine houses throughout the city gives the information in detail. (See tabulation.)

BACTERIAL ANALYSIS OF DETROIT WATER

Summary of Monthly Averages—July, 1915 - July, 1916

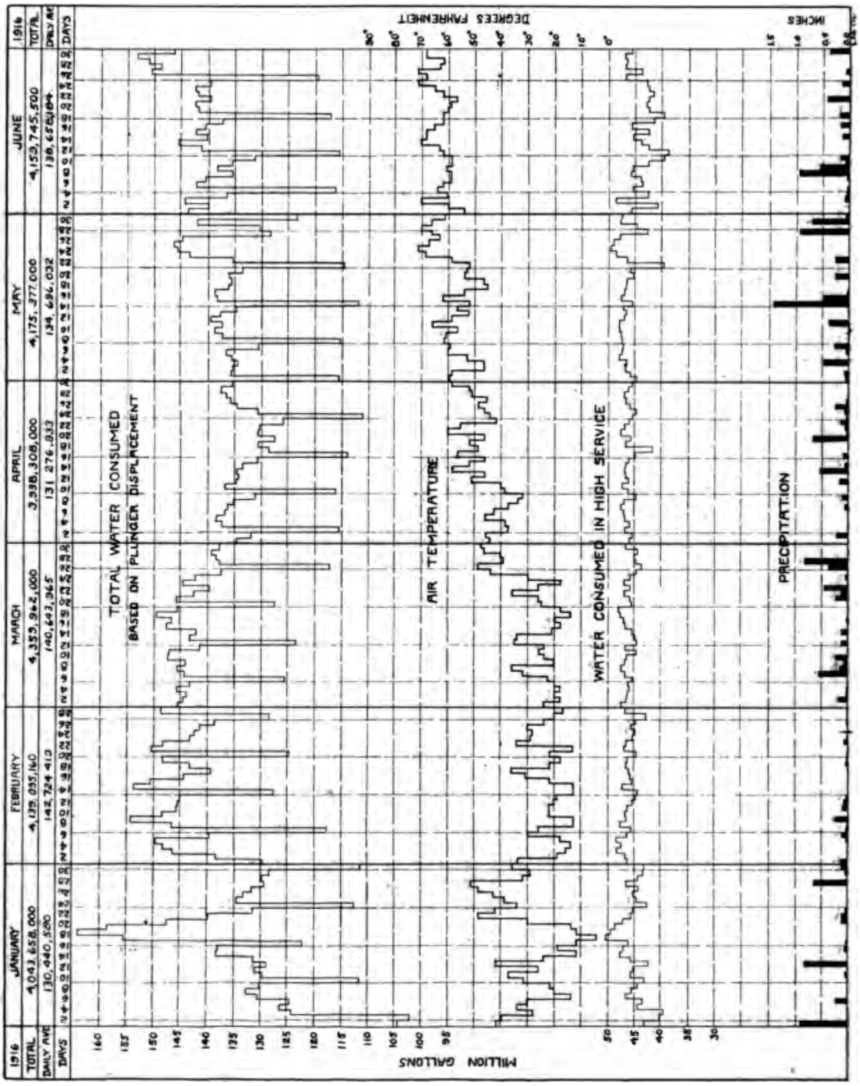
Month	RAW WATER							TREATED WATER							TAP WATER					
	Agar at 20°	Agar at 37°	Gelatin at 20°	B. Coli 1 c.c.	B. Coli 10 c.c.	B. Coli 100 c.c.	Turbidity	Agar at 20°	Agar at 37°	Gelatin at 20°	B. Coli 1 c.c.	B. Coli 10 c.c.	B. Coli 100 c.c.	Turbidity	Agar at 20°	Agar at 37°	Gelatin at 20°	B. Coli 1 c.c.	B. Coli 10 c.c.	B. Coli 100 c.c.
July—1915	28.8	11.7	46.2	7/71	177/355	13.7	30.0	15.5	5.9	18.6	0/71	6/355	.13	28.9	5.8	3.6	6.8	......	......	.08
August	41.3	21.0	57.6	9/74	270/370	18.9	41.4	5.7	4.6	5.5	0/74	0/370	.00	39.0	6.2	5.0	8.4	......	......	.00
September	24.5	9.7	32.5	10/72	212/360	12.0	40.4	3.7	3.7	3.8	0/72	5/360	.14	35.8	3.2	2.1	2.0	......	......	.38
October	24.7	11.7	28.6	2/63	147/315	7.3	39.6	3.4	3.2	4.0	0/63	1/315	.00	37.1	8.1	4.3	10.7	......	......	.25
November	116.3	21.8	116.4	2/52	83/260	7.0	54.4	14.2	5.8	16.7	0/51	7/255	.28	49.0	18.2	11.3	16.1	......	......	.23
December	55.7	6.2	56.9	2/41	42/205	6.7	28.3	7.4	1.9	3.3	0/43	8/215	.39	27.4	3.1	1.6	2.9	......	......	.09
January—1916	180.4	41.3	157.6	17/56	162/280	33.8	18.2	23.0	18.0	21.5	3/57	95/285	6.40	16.2	14.2	12.3	12.0	......	......	16.30
February	178.7	50.5	87.5	16/52	150/260	34.2	16.2	15.9	20.0	7.6	1/52	80/260	4.90	16.0	13.3	24.4	5.8	......	......	6.30
March	56.5	6.4	36.3	2/54	41/270	5.0	0.0	1.7	3.7	1.4	0/54	8/270	.22	0.0	1.5	3.8	1.0	......	......	.44
April	1375.0	88.0	1439.0	4/51	83/255	10.4	36.2	53.0	38.0	52.0	0/51	2/255	.08	32.2	28.6	31.2	27.8	......	......	.08
May	93.0	25.7	109.0	7/53	87/265	13.9	21.5	13.8	15.7	16.8	0/53	3/265	.11	17.8	14.9	11.6	18.1	......	......	.00
June	71.7	21.7	83.3	3/51	120/255	10.0	20.0	23.5	14.2	23.3	0/51	3/255	.10	17.8	41.0	21.0	42.0	......	......	.23
				Total	Total						Total	Total								
Average	187.2	26.3	187.6	81/690	1574/3450	14.4	28.8	15.1	11.2	14.5	4/692	218/3460	1.06	26.4	13.2	11.0	12.8	......	......	2.03

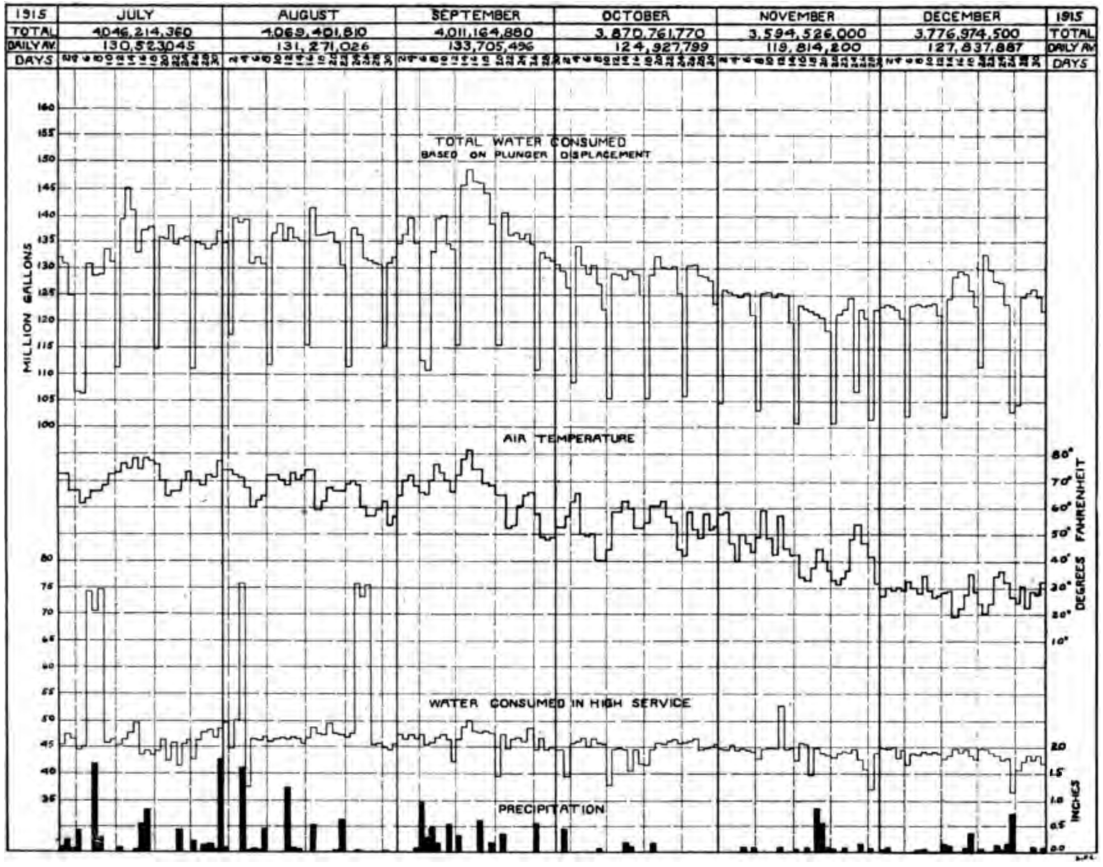
Presumptive tests—July 1-1915 to Feb. 29, 1916.
Confirmed tests —Mar. 1-1916 to June 30, 1916.

Table of Pressures.

	LOCATION OF GAUGES	Elevat'n above City Datum	Pressure Corresponding to diff. in Elevat'n between Pump Wells and Engine Gauges	July 1, 1915 to June 30, 1916. Average Daily Consumption 122,162,805 gallons Total Consumption for Year 44,589,423,898 gallons				July 1, 1915 to June 30 1916 Average Daily Consumption 127,565,434 gallons Total Consumption for Year 46,688,949,000 gallons				Increase or Decrease in Friction During last Year		Maximum Hour observed Jan. 17, 1916, 8,035,600 gals. 10 a. m. to 11 a. m. Daily Rate 192,854,400 gals.		Minimum Hour observed May 27, 1916 3,001,250 gals. 3 a. m. to 4 a. m. Daily Rate 72,030,000 gals.	
				Pressures, Pounds			Fric. Loss Pounds	Pressures, Pounds			Fric. Loss Pounds	Pounds		Average Pressure Pounds	Fric. Loss Pounds	Average Pressure Pounds	Fric. Loss Pounds
		Feet	Pounds	High	Low	Mean		High	Low	Mean		Inc.	Dec.				
Low Service	Pumping Station	92.00	....	68	44	47.1	....	71	20	47.5	....	......	.....	45.7		45.7	....
	Engine No. 32, Hart and Jefferson	108.42	4.9	47	33	40.7	1.5	47	24	39.9	2.7	1.2	.....	35.0	5.8	40.0	0.8
	Engine No. 26, Crane and Brinket	125.79	14.6	38	26	32.1	0.4	38	18	33.3	....	......	.....	32.0	....	32.5	....
	Engine No. 7, Concord, near Jefferson	124.77	14.2	38	25	34.2	....	37	15	31.5	1.8	......	.....	29.0	2.5	30.0	1.5
	Engine No. 19, Congress, near Jos. Campau	122.47	13.2	37	25	30.8	3.1	35	15	31.1	3.2	0.1	.....	29.5	3.0	31.0	1.5
	Engine No. 2, Hastings, near Congress	120.98	12.6	36	18	28.5	6.0	34	15	29.5	5.4	......	0.6	25.5	7.6	30.0	3.1
	Water Office, Randolph and Jefferson	125.18	14.4	32	19	26.1	6.6	33	10	27.3	5.8	......	0.8	24.0	7.3	28.0	3.3
	Engine No. 3, Griswold and Clifford	128.06	13.4	34	20	28.3	5.4	33	15	29.1	5.0	......	0.4	26.0	6.3	30.0	2.3
	Engine No. 8, Sixth and Baker	122.14	13.1	35	20	29.4	4.6	36	14	28.9	5.5	0.9	.....	25.0	7.6	30.0	2.6
	Engine No. 4, Eighteenth, near Howard	116.18	10.5	35	20	28.8	7.8	34	15	29.9	7.1	......	0.7	27.5	7.7	30.5	4.7
	Engine No 10, Sixteenth and Bagg	125.28	14.4	35	17	26.9	5.8	34	12	28.0	5.1	......	0.7	26.0	5.3	29.0	2.3
	Engine No. 15, Hubbard near Fort	114.62	9.8	37	20	30.1	7.2	38	17	31.8	5.9	......	1.3	26.0	9.9	32.0	3.9
	Engine No. 29, Solvay and W. Jefferson	115.05	10.0	36	19	29.5	7.6	37	15	30.7	6.8	......	0.8	26.0	9.7	33.5	2.2
	Truck No. 13, Fort and Lewerenz	115.56	10.2	36	16	28.8	8.1	38	16	30.2	7.1	......	1.0	25.5	10.0	32.0	3.5
	Engine No. 27, Junction and Rogers	113.74	9.4	38	18	30.8	6.9	39	17	32.0	6.1	......	0.8	27.0	9.3	33.0	3.3
	Engine No. 14, Scotten near Michigan	121.37	12.7	39	20	32.0	2.4	37	18	33.0	1.8	......	0.6	28.5	4.5	33.0	....
	Engine No. 22, Michigan, near Hammond	119.14	11.8	35	14	27.0	8.3	36	16	28.6	7.1	......	1.2	21.0	12.9	30.0	3.9
	Truck No. 10, Sheridan and Mack	140.25	20.9	30	17	23.6	2.6	30	8	23.4	3.2	0.6	.....	21.5	3.3	22.5	2.3
	Engine No. 18, Mt. Elliott near Sylvester	146.23	23.5	28	14	21.7	1.9	26	5	21.4	2.6	0.7	.....	16.5	5.7	21.0	1.2
	Engine No. 11, Grandy, near Gratiot	143.21	22.2	28	16	24.0	0.9	29	8	24.1	1.2	0.3	.....	16.0	7.5	24.0	....
	Engine No. 6, High, near Hastings	142.63	21.9	26	12	20.6	4.6	25	13	20.1	5.5	0.9	.....	15.5	8.3	20.0	3.8
	Storage Yard, Orleans and Erskine	150.64	25.4	23	17	16.2	5.5	22	5	15.9	6.2	0.7	.....	12.5	7.8	16.0	4.3
	Truck No. 5, Russell and Erskine	147.74	24.1	24	7	16.9	6.1	22	2	17.8	5.6	......	0.5	16.5	5.1	16.5	5.1
	Engine No. 5, Alexandrine, near Cass	148.48	24.5	23	8	17.4	5.2	23	1	18.6	4.4	......	0.8	14.5	6.7	18.0	3.2
	Engine No. 12, Sixteenth and Grand River	141.55	21.5	28	11	20.0	5.6	27	3	20.1	5.9	0.3	.....	16.5	7.7	21.5	2.7
	Engine No. 31, Cobb and W. Grand Blvd	135.12	18.7	28	8	21.3	7.1	29	7	22.2	6.6	......	0.5	17.0	10.0	22.5	4.5
	Engine No. 20, Baldwin and Gratiot	145.37	23.1	30	13	21.6	2.4	30	6	21.8	2.6	0.2	.....	15.0	7.6	21.5	1.1
	Average	....	....	......	......	27.2	....	.....	......	27.7	....	......	.....	....	....	......	....
High Service	Pumping Station	92.00	....	79	45	64.7	....	104	45	65.7	....	......	.....	70.5	......	60.0	....
	Engine No. 18, Mt. Elliott, near Sylvester	146.23	23.5	49	30	39.4	1.8	49	31	40.3	1.9	0.1	.....	42.0	5.0	38.5	....
	Engine No. 23, Moran and Boulevard	154.29	27.0	43	23	31.9	5.8	41	21	32.8	5.9	0.1	.	33.0	10.5	31.0	2.0
	Engine No. 28, Riopelle and Milwaukee	155.56	27.5	36	17	28.5	8.7	37	14	29.8	8.4	......	0.3	28.0	15.0	29.0	3.5
	Engine No. 13, Russell and Ferry	157.30	28.3	36	18	28.1	8.3	36	19	29.8	7.6	......	0.7	26.5	15.7	29.5	2.2
	Engine No. 17, Cass and Amsterdam	152.83	26.3	33	12	25.9	12.5	36	18	28.2	11.2	......	1.3	23.0	21.2	28.5	5.2
	Engine No. 21, Lincoln, near Piquette	154.88	27.2	31	10	23.7	13.8	32	15	26.5	12.0	......	1.8	20.0	23.3	27.5	5.3
	Engine No. 24, Kenilworth, near John R	155.86	27.6	33	10	26.4	10.7	35	20	28.9	9.2		1.5	26.0	16.9	29.0	3.4
	Engine No. 12, Sixteenth and Grand River	141.55	21.5	31	9	24.6	18.6	30	14	24.3	19.9	1.3	....	17.5	31.5	27.0	11.5
	Storage Yard, Orleans and Erskine	150.64	25.4	44	21	31.7	7.6	43	20	30.8	9.5	1.9	.....	33.0	12.1	27.5	7.1
	Engine No. 1, Hamtramck (Nov. 9, 1915 on)	....	....		......	....	....	35	14	25.6	......	......	.....	16.0	....	26.5	....
	Average	.. ..	....	......	......	32.5	...	.....		33.7	....	......	.....	....	....	....	....

Note—Engine No. 1, Hamtramck, not averaged with high service.


1916
TOTAL
DAILY AVE
DAYS
JANUARY
4,043,658,000
130,440,580
FEBRUARY
4,139,095,160
142,724,410
MARCH
4,359,962,000
140,643,965
APRIL
3,938,308,000
131,276,933
MAY
4,175,377,000
134,696,032
JUNE
4,159,745,500
138,658,184
1916
TOTAL
DAILY AVE
DAYS
MILLION GALLONS
160
155
150
145
140
135
130
125
120
115
110
105
100
95
50
45
40
35
30
DEGREES FAHRENHEIT
90°
80°
70°
60°
50°
40°
30°
20°
10°
0°
INCHES
1.5
1.0
0.5
0.0
TOTAL WATER CONSUMED
BASED ON PLUNGER DISPLACEMENT
AIR TEMPERATURE
WATER CONSUMED IN HIGH SERVICE
PRECIPITATION


1915
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
1915
TOTAL
4046,214,360
4069,401,810
4,011,164,880
3,870,761,770
3,594,526,000
3,776,974,500
TOTAL
DAILY AV.
130,523045
131,271,026
133,705,496
124,927,799
119,814,200
127,837,887
DAILY AV.
DAYS
DAYS
MILLION GALLONS
160
155
150
145
140
135
130
125
120
115
110
105
100
80
75
70
65
60
55
50
45
40
35
TOTAL WATER CONSUMED
BASED ON PLUNGER DISPLACEMENT
AIR TEMPERATURE
WATER CONSUMED IN HIGH SERVICE
PRECIPITATION
DEGREES FAHRENHEIT
80°
70°
60°
50°
40°
30°
20°
10°
INCHES
2.0
1.5
1.0
0.5
0.0

PIPE SYSTEM

There were laid during the year a total of 259,671 feet or 49.18 miles of water mains, and 5,044 feet or 0.95 miles of small obsolete mains were removed and replaced with larger ones—a net gain of 48.23 miles and making a total of 1,004.84 miles of water mains in the entire system. The quantities given in the summary of pipe laid in Detroit and outside villages represent the lines actually completed, and for which the complete costs have been recorded.

Of the total mileage of pipe, 151.14 miles or 15.04 per cent. is 12 inches in diameter and larger, of which 50.24 miles is 42 inches and 48 inches in diameter, 8 miles of these two largest sizes having been laid during the past year.

The most important work accomplished in the line of water main extensions, was the completion of the Jefferson Avenue 48 inch main, work on which was well under way during the preceding year. This main extends from the Pumping Station west on Jefferson to Sixth; north on Sixth to Pine; east on Pine to Fourth, and north on Fourth to Peterboro, connecting at this point with the Charlevoix Avenue 48 inch main, thus forming a complete loop of 48 inch pipe. Connections were also made between this main and the 42 inch main at Sixth and Lafayette and the 48 inch main at Sixth and High Streets.

The extension of the Baker Street 48 inch main, necessitated by the widening and double tracking of that thoroughfare, was completed to Vinewood Avenue, where connection was made with the 24 inch main.

On the high service the extension of the 42 inch main was completed from Canfield and St. Antoine to West Grand Boulevard and Twelfth Street, joining there with the 24 inch main on the Boulevard, and the 36 inch main extending north on Twelfth Street, the latter also having been extended north on Twelfth Street to Burlingame Avenue.

The total construction cost of water mains for the year was $864,732.35, and the unit costs of the various sizes are shown in the table below:

COST PER FOOT.

Size	No. of Feet	Material, etc.	Labor	Overhead Expense	Total
4"	804	$ .56	$ .37	$ .05	$ .98
6"	118,523	.64	.45	.05	1.14
8"	81,010	.70	.45	.05	1.20
10"	2,055	1.28	1.02	.11	2.41
12"	3,908	1.58	.96	.11	2.65
16"	208	2.64	1.13	.13	3.90
24"	5,095	3.74	1.98	.25	5.97
48"	29,581	11.74	7.21	.84	19.79

The following tables give full detailed information relating to all water mains laid during the year both in Detroit and surrounding territory and also a summary of all mains in the distribution system.

Report of Pipe Laid, July 1st, 1915, to June 30th, 1916

Size	Detroit			Grosse Pointe Parks	St. Clair Heights	Hamtramck	Greenfield	Oakwood	Grosse Pointe Township	Outside City		Entire System			
	Feet Laid	%	Dis-cont'd.	Feet Laid	Feet Laid	Feet Laid	Feet Laid	Feet Laid	Feet Laid	Feet Laid	%	Total Laid	%	Total Dis-cont'd.	Net Gain
2'															
3'			1,106											1,106	—1106
4'	804	.43	2,260									804	.33	2,260	—1456
6'	76,932	41.30	1,487	13,682	1,660	19,195	2,061	3,148	1,845	41,591	75.7	118,523	49.14	1,487	117,036
8'	67,988	36.50		4,595		4,957	3,470			13,022	23.8	81,010	33.59		81,010
10'	2,055	1.10										2,055	.85		2,055
12'	3,623	1.94	191				285			285	5	3,908	1.62	191	3,717
16'	208	.11										208	.09		208
18'															
20'															
24'	5,095	2.74										5,095	2.11		5,095
30'															
36'															
42'															
45'															
48'	29,581	15.88										29,581	12.27		29,581
Feet	186,286	100.00	5,044	18,277	1,660	24,152	5,816	3,148	1,845	54,898	100	241,184	100.00	5,044	236,140
Miles	35.29		0.95	3.46	0.31	4.57	1.10	0.60	0.35	10.39		45.68		0.95	44.73
Additional Pipe Laid on Which Costs Were Not Complete															
36'	5,856											5,856			
42'	12,631											12,631			
Tot. Ft.	204,773											259,671			254,627
Tot. Mls	38.78													49.18	48.23

Total Pipe in System, As of June 30th, 1916

Size	Detroit		Grosse Pointe Parks	St. Clair Heights	Lees-ville	Ham-tramck	State Fair Line	River Rouge	Ecorse	Green-field	Oak-wood	High-land Park	Grat't Twp.	Gr'se P'nte Twp.	Outside City		Entire System	
	Total	%	Total	Total	Total	Total	Total	Total	Total	Total	Total	Total	Total	Total	Total	%	Total	%
2"	4,624	.10															4,624	.09
3"	49,343	1.08															49,343	.93
4"	730,355	15.92				20,748		10,987	1,943						33,678	4.82	764,033	14.45
6"	2,002,924	43.66	19,263	39,448	1071	153,243		47,374	29,919	22,482	18,203	111,376	4614	1845	448,838	64.17	2,451,762	46.37
8"	810,932	17.68	15,396	14,438	4394	45,341	9,392	9,426	11,615	24,385	4,032	39,101	1337		178,857	25.57	989,789	18.72
10"	241,462	5.26		49		3,476						4,298			7,823	1.12	249,285	4.72
12"	205,792	4.49		51,89		351		402		946	2,180	4,887			13,955	2.00	219,747	4.16
16"	101,465	2.21						4,298		1,129	220	9,982			15,629	2.23	117,094	2.22
18"	87	.00															87	0.00
20"	393	.01															393	.01
24"	115,910	2.53									626				626	0.09	116,536	2.21
30"	54,651	1.19															54,651	1.03
36"	9,085	.20															9,085	.17
42"	118,654	2.58															118,654	2.24
45"	103	.00															103	.00
48"	141,884	3.09															141,884	2.68
Feet	4,587,664	100.00	34,659	59,124	5,465	223,159	9,392	72,487	43,477	48,942	25,261	169,644	5951	1845	699,406	100.00	5,287,070	100.00
Miles	868.88		6.56	11.20	1.04	42.26	1.78	13.73	8.23	9.27	4.78	32.13	1.13	0.35	132.46		1001.34	

Additional Pipe Laid on which Costs were not completed

Size	Detroit Total	Entire System Total
36"	5,856	
42"	12,631	
T'l. ft.	4,606,151	5,305,557
T'l Ml	872.38	1004.84

Summary of the Amount and Cost of Pipe Laid in Detroit and Outside Villages, Year Ending June 30th, 1916

Location	Feet	Size	Material Etc.	Labor	Overhead Expense	Total	Grand Total
City of Detroit..............	804	4"	$ 449.02	$ 303.32	$ 37.28	$ 789.62	$.........
	76,932	6"	48,718.92	38,605.25	4,568.41	91,892.58	....
	67,988	8.	48,397.46	32,409.45	3,807.97	84,614.88	....
	2,055	10"	2,623.00	2,102.30	230.01	4,955.31	....
	3,623	12"	5,840.02	3,611.60	399.95	9,851.57	....
	208	16"	548.22	235.28	27.25	810.75	....
	5,095	24"	19,076.41	10,083.74	1,284.30	30,444.45	....
	29,581	48"	347,159.45	213,365.99	24,707.68	585,233.12	808,592.28
Village of Hamtramck........	15,631	6"	9,601.14	5,158.23	609.83	15,369.20	....
	4,957	8"	3,629.82	2,033.64	247.38	5,910.84	21,280.04
Township of Hamtramck.....	3,564	6"	1,903.02	1,027.62	127.35	3,057.99	3,057.99
Village of Grosse Pt. Pks....	13,682	6"	9,784.70	939.31	110.66	2,491.39	....
	4,595	8"	2,145.50	5,717.63	679.52	16,181.85	....
Township of Greenfield.......	2,061	6"	1,441.42	982.40	113.85	3,241.75	19,423.60
	3,470	8"	2,072.68	128.25	14.86	493.76	6,573.00
	285	12"	350.65	1,357.94	157.23	3,587.85	....
Village of Oakwood..........	3,148	6"	1,838.30	1,029.31	134.74	3,002.35	3,002.35
Township of Grosse Pointe...	1,845	6"	801.37	504.99	36.21	1,402.57	1,402.57
Village of St. Clair Heights..	1,660	6"	838.19	503.97	58.36	1,400.52	1,400.52
	241,184		$507,219.29	$320,160.22	$ 37,352.84	$864,732.35	$864,732.35

Pipe Laid Year Ending June 30th, 1916

		Feet	Size	
Apr. 26,	Alexandrine E., Moran	15	4″	
Dec. 8,	Algonquin, Jefferson South	888	8″	
Sept. 14,	Alley E., Library, Gratiot to Gd. River	419	8″	
Mar. 28,	Alter Road N., Waterloo North	667	6″	
Aug. 7,	Alter Road N., Waterloo North	364	6″	
July 14,	Apple, St. John North	86	6″	
	St. John, 36′ E., Apple West	351	8″	
Dec. 3,	Ashland S., Kercheval	32	6″	
Dec. 10,	Atkinson W., Wilson West	519	6″	
Jan. 11,	Auderdon, Kercheval to N. Waterloo	1,053	8″	
Aug. 2,	Anderson, Nall to Conant	826	8″	a
May 13,	Audrain, Clippert to Martin	539	6″	
July 29,	Baker, 16th to Vinewood	4,125	48″	
	Baker and Vinewood	32	24″	
Nov. 24,	Barry, McClellan East	560	6″	
May 7,	Beaconsfield N., Jefferson	1,525	8″	c
Dec. 28,	Bedford Rd., S., St. Paul to Mack	3,451	6″	c
July 19,	Beechwood S., Milford North	572	8″	
Sept. 16,	Bellevue, Warren to Forest	840	8″	
Apr. 5,	Bellevue, Miller North	673	6″	
	Concord, Miller North	679	6″	
	Canton, Miller North	671	6″	
	Helen, Miller North	672	6″	
	Field, Miller North	673	6″	
	Miller, Helen to Field	938	6″	
	Schmitz, Center Line to W. Concord	639	6″	
	Concord, Schmitz South	290	6″	
	Gable, Center Line East	208	6″	
	Center Line, Harper to N. Erbie	2,460	8″	
	Piscopink, Center Line East	944	8″	
Nov. 23,	Belvidere, S. Graves	138	6″	
Dec. 18,	Boulevard, Trombley North	158	6″	
Nov. 13,	Boulevard, Beaufait to Bellevue	373	6″	
July 28,	W. Gd. Blvd., Linwood to Wade	366	6″	
July 9,	E. Gd. Blvd., 197′ E., Elmwood East	292	6″	
Dec. 21,	Brentwood, Woodward East	1,917	8″	
	Glenmere, Woodward East	2,036	6″	
Nov. 24,	Bruckner, Parkinson East	240	8″	
Feb. 9,	Buckingham, N., Jefferson North	1,752	6″	c
May 18,	Burns, N. & S., Moffat	562	8″	
Mar. 9,	Burns, Canfield South	141	8″	
Oct. 19,	Burns, N. Moffat	133	8″	
Aug. 17,	Burns, S. Canfield	158	8″	
May 16,	Cabot, Mandale North	370	6″	
	Lawndale and Navy, Set 8″ gate			
	Lawndale and Rathbone, Set 8″ gate			
	Lawndale and Longworth, Set 8″ gate			
Feb. 25,	Cadillac, Jean South	190	6″	
Nov. 10,	Cahalan, Central West	171	8″	
Dec. 18,	Calvert, W. Hamilton Blvd	762	6″	
Dec. 3,	Cardoni, N. Woodland	61	8″	
Nov. 22,	Central, N. Panama	72	10″	

		Feet	Size	
Sept. 22,	Central, Navy to Cahalan	550	12″	
	Cahalan, Central East	451	8″	
Jan. 6,	Central, Lodge South	367	6″	
Apr. 1,	Central, Cahalan to Lane	267	12″	
	Lane, Central East	275	6″	
Sept. 18,	Clairmont, Wilson West	162	6″	
Nov. 18,	Clairepointe, N. Freud	220	8″	
May 24,	Clairepointe, N. & S. Freud	180	8″	
July 20,	Clippert, Audrain to Dennis	529	8″	
July 29,	Chalmers N., Essex South	160	8″	
Oct. 4,	Chalmers, Kercheval North	708	6″	
Feb. 23,	Collingwood W., Hamilton West	1,916	8″	
July 13,	Comstock, Conant East	591	6″	a
Dec. 4,	Conant, Mt. Elliott North	1,049	8″	
May 20,	Connor, N. & S. Freud	559	6″	
Oct. 24,	Cooper, Warren South	426	8″	
Sept. 24,	Coplin, Kercheval to N. Waterloo	1,345	6″	
July 9,	Daniels, Horatio North	163	6″	
Nov. 11,	Daniels, McGraw South	224	6″	
Aug. 25,	Delmar, N. Westminister	157	8″	
Aug. 25,	Delmar, Caniff South	500	8″	
Dec. 18,	Delmar, N. Westminister	160	8″	
Mar. 6,	Dequindre, Kenwood to Westminster	1,021	8″	
	Dyar, Kenwood to Westminster	1,015	6″	a
July 16,	Dequindre, Belmont South	451	8″	a
Aug. 21,	Dexter Blvd. crossings	432	6″	
	Euclid to Forestdale	344	10″	
Mar. 10,	Dexter, Maidstone North	217	10″	
Mar. 31,	Devonshire, Jefferson North	3,253	6″	c
May 2,	Dickerson, N. & S. Waterloo	1,408	8″	
May 11,	Drake, S. Freud	607	6″	
Nov. 11,	Drake, S. Freud	62	6″	
Nov. 26,	Drexel, S. Waterloo to N. Charlevoix	1,415	8″	
Oct. 8,	Drexel, Kercheval North	662	8″	
Aug. 18,	Duncan, Van Dyke to Baldwin	487	6″	
Sept. 10,	Dupont, Graham North	146	4″	
July 17,	Edison, 203′ W. Wilson West	269	8″	e
Dec. 9,	Edison, W. Hamilton Blvd	298	8″	
July 7,	Edward crossing Martin	46	6″	
Oct. 12,	Elmwood, Caniff to Casemere	948	6″	
	Sobieski, Caniff to Carpenter	2,670	6″	
	Nall, Carpenter to Casemere	1,783	6″	a
Nov. 5,	Elsmere, Mason Place South	174	8″	
	Mason Place, Elsmere East	144	8″	
May 26,	Emerson, S. Freud	639	6″	
Dec. 24,	Engle, S. Edlie	62	6″	
Oct. 11,	Engle, S. Edlie	62	6″	
Nov. 5,	Epworth Blvd., Warren to N. Milford	1,500	8″	
	Milford, crossing Epworth	25	6″	
Dec. 23,	Epworth Blvd., N. Milford	128	8″	
Jan. 10,	Euclid, Gd. River E	437	6″	
May 13,	Evans, S. Freud	422	6″	
Aug. 30,	Farnsworth, Moran to Elmwood	698	6″	
Sept. 17,	Farrand, Pennsylvania West	156	6″	

		Feet	Size	
Oct. 14,	Fleming, Caniff to Carpenter	2,636	8"	
	St. Aubin, Caniff to Carpenter	2,624	6"	
	Lumpkin, Caniff to Carpenter	2,623	6"	
		23	8"	
	Crossings in above streets	109	6"	a
July 30,	Forman, crossing Wabash R .R.	199	4"	
Aug. 24,	Fort St. W., Pleasant to Dearborn	2,760	6"	
	S. Dearborn, Fort St. S.	388	6"	f
Apr. 5,	Foster, N. Strong	616	6"	
Nov. 5,	Foster, Miller to Kosciuszko	728	6"	
	Kosciuszko, Mt. Elliott	433	6"	
	Miller, West of Foster	460	6"	b
Sept. 21,	14th, A. S., Lothrop South	184	8"	
Sept. 16,	Fourth, Peterboro to Pine	1,725	48"	
	Pine, 4th to 6th	765	48"	
	6th, Pine to Lafayette	4,082	48"	
	Fourth, Bagg to Gd. River	825	8"	
Feb. 24,	Garland, Gratiot to McClellan	520	8"	
	McClellan, Garland North	87	6"	
Dec. 15,	Garland, Forest to N. Warren	1,660	6"	g
May 19,	Gartner, E. Central	290	6"	
Nov. 10,	Gartner, Central East	204	6"	
Sept. 9,	Gartner, Lawndale East	776	6"	
Aug. 25,	Gladys, Livernois West	342	6"	
Dec. 16,	Glynn Ct., W. Hamilton Blvd	344	8"	
Aug. 7,	Goethe, Pennsylvania West	144	6"	
Aug. 10,	Hamilton, 1,175' S., Jefferson South	122	6"	
July 9,	Hanover crossing, LaSalle Gds. S.	36	8"	
	LaSalle Gds., Hanover East	101	8"	
Dec. 8,	Harbor, W. Ashland	16	6"	
Apr. 18,	Harper, Woodward East	220	8"	
Aug. 20,	Harper Ct., S. Harper	288	4"	
May 20,	Harry, E. McClellan	100	6"	
Nov. 3,	Hartwick, Clay North	1,261	8"	
Sept. 18,	Hazelwood, E. of Wilson West	742	6"	
Aug. 20,	Heidelberg, crossing McDougall	26	6"	
	Berlin, McDougall to Elmwood	745	8"	
Nov. 3,	Hillger, Mack South	977	6"	d
July 9,	Hogarth, Linwood West	374	8"	
	Linwood, Whitney to Hogarth	256	8"	
	Linwood, crossing Maidstone	28	8"	
	Nicolet, crossing Linwood	30	6"	
	Vicksburg, crossing Linwood	60	6"	
	Linwood, crossing Whitney	37	8"	
	Linwood, crossing Hogarth	23	8"	
	Linwood, crossing Lothrop	33	8"	
	Linwood, crossing Northwestern	22	8"	
	A. N. Lamothe, crossing Linwood	58	6"	
	Linwood, crossing LaSalle Gds. N.	28	8"	
Aug. 3,	Holmes, Mackay to Fleming	726	6"	
	Mackay, crossing Tolmes	73	6"	a
Dec. 31,	Homer, Elsmere West	441	6"	
Aug. 2,	Homer, Elsmere East	240	6"	
Sept. 3,	Honorah, Dix to S. of Pitt	1,046	6"	

		Feet	Size	
July 10,	Hugo, 404' E. Conant East	322	6"	a
Nov. 15,	Hupp, N. of Essex	245	8"	
Aug. 13,	Hurlbut, N. of Moffat South	446	8"	
July 27,	Iosco, crossing Gd. River	74	6"	
	Arcadia, crossing Gd. River	74	6"	
Jan. 8,	Iosco, Mackinaw West	62	6"	
May 23,	Inglis, N. Ferndale	76	6"	
Aug. 27,	Ironwood, Moore Place North	35	8"	
Aug. 18,	Iroquois, S. Sylvester	75	8"	
Aug. 14,	Iroquois, Forest South	450	8"	
Dec. 7,	Iroquois, N. Waterloo	763	8"	
May 2,	Iroquois, N. Harper	171	8"	
Apr. 18,	Jefferson, Island View to Lodge			
	Lodge, Jefferson South	688	8"	
Jan. 5,	Jefferson, 304' E., Bellevue East	499	48"	
Dec. 3,	Jefferson W., Hastings to 6th	6,129	48"	
	6th, Jefferson to Lafayette	982	48"	
Dec. 27,	Jefferson, Chene to Beaufait	4,878	48"	
Nov. 26,	John R., Hugo to Savannah	285	12"	
	Savannah, Wilson to John R	1,284	8"	
	Iowa, E. John R	25	6"	e
July 20,	Kensington Rd., S. St. Paul to Mack	3,329	6"	c
Dec. 31,	Kercheval, Oneida West	208	16"	
		6	8"	
Nov. 5,	Lafayette E., Lawndale	72	6"	
Nov. 27,	Lakeview, 246' S., Kercheval North	782	8"	
Oct. 2,	Lakeview, N. Kercheval	60	8"	
Nov. 17,	Lakewood, N. Freud to S. Essex	1,489	8"	
Aug. 2,	Lamothe, Dunedin East	238	6"	
Nov. 5,	Lane, Lawndale West	425	8"	
Mar. 15,	LaSalle Gds. N., E. 14th East	326	6"	
July 3,	LaSalle Gds. S., crossing Dunedin	37	8"	
	Bethune, crossing Dunedin	24	6"	
	Dunedin, LaSalle Gds. S., North	126	6"	
Aug. 5,	LaSalle Gds. S., 12th to Dunedin	489	8"	
Aug. 6,	Ledyard, 3rd to 4th	269	6"	
May 24,	Lee Place, W. Wilson	1,053	6"	
Sept. 28,	Lenox, Charlevoix South	615	8"	
July 22,	Lenox, 164', S. Waterloo North	635	8"	
July 21,	Linslade, Gd. River West	310	6"	
July 8,	Linwood, N. Columbus South	171	8"	
Aug. 14,	Linwood, Hogarth South	114	8"	
July 19,	Lisbon, Beard West	340	6"	
Nov. 12,	Lisbon, Green East	400	6"	
Nov. 10,	Lodge, Central East	412	6"	
Nov. 10,	Logan, Central East	390	6"	
Sept. 28,	Longworth, Elsmere East	298	8"	
Aug. 26,	Longworth, E. Elsmere	90	8"	
July 12,	Lumley, 964' N., Michigan North	60	6"	
Nov. 2,	Lycaste, Mack South	806	6"	
Oct. 28,	Lycaste, S. Goethe	52	6"	
Dec. 23,	Lycaste, S. Mack	62	6"	d
Sept. 13,	Lyman, Dubois to St. Aubin	526	6"	
Nov. 10,	McGraw, Gilbert to W. Cicotte	487	6"	

		Feet	Size	
Oct. 28,	McGraw, Wesson to Military	750	8″	
	McGraw, Military to Livernois	418	8″	
	McGraw, Wesson West	70	8″	
	Wesson, McGraw North	64	8″	
Sept. 14,	McGraw, 35th to Campbell	268	6″	
	35th, McGraw North	131	6″	
	Campbell, McGraw North	179	6″	
July 14,	McGraw, 32nd St. E.	131	6″	
July 9,	McGraw, W. Livernois to Gilbert	60	6″	
Aug. 2,	Mackay, Stuart South	154	6″	
	Burger, Mackay to Fleming	724	6″	a
Aug. 2,	Mackay, Virginia South	156	6″	
	Casmere to Mackay to Fleming	724	6″	a
Nov. 16,	Mackie, Harbough East	501	6″	
Oct. 13,	Mackinaw, S. of Iosco to Petoskey	623	6″	
Apr. 7,	Maidstone, E. & W., Holmur	440	8″	
Jan. 11,	Maidstone, 377′ W., Dexter Blvd	110	8″	
Jan. 10,	Maidstone, E. Radford East	74	8″	
Oct. 6,	Maidstone, Radford East	521	8″	
Aug. 17,	Maidstone, W. Dexter Blvd	108	8″	
July 13,	Maidstone, Dexter West	344	8″	
Dec. 3,	Manistique, N. Essex	212	8″	
Aug. 5,	Manistique, S. Jefferson	1,410	8″	
Oct. 20,	Maplewood W., Ironwood to Thornton	937	6″	
Aug. 28,	Maplewood W., Ironwood	151	6″	
Nov. 12,	Marlborough, S. Kercheval	18	6″	
Oct. 11,	Meadowbrook, S. Jefferson	74	6″	
Aug. 11,	Meadowbrook, S. Jefferson	256	6″	
Sept. 1,	Michigan, Central to City Limits	1,190	24″	
Dec. 23,	Milford, W. Epworth Blvd	408	6″	
Apr. 4,	Miller, Mt. Elliott East	209	6″	
Oct. 11,	Montclair, S. Edlie	274	8″	
May 30,	Montclair, N. & S. Shoemaker	2,031	6″	
	Garland, Shoemaker to Harper	2,176	6″	
	Bewick, Shoemaker to N. Harper	1,158	6″	g
July 11,	Muster W., Artillery West	45	6″	
Jan. 22,	Nardin, Gd. River East	871	8″	
Apr. 12,	Navahoe, Jefferson South	813	8″	
Sept. 4,	Navy, Green West	365	8″	
Mar. 28,	Othmar, Livernois to Reaume	317	6″	
	Reaume, Othmar to Gd. River	1,215	6″	
	Georgeland, Livernois West	280	6″	
Nov. 3,	Oliver, E. Conant	389	6″	a
Jan. 21,	Pacific, 662′ W., Ironwood West	183	8″	
Aug. 28,	Pacific, W. Ironwood	40	8″	
Aug. 14,	Parker, Sylvester South	158	6″	
May 11,	Parkinson, Michigan South	790	8″	
Nov. 13,	Parkinson, Bulwer to Clayton	257	6″	
	Bulwer, Parkinson West	181	6″	
May 12,	Parkwood, W. Martin	91	6″	
Nov. 22,	Parkwood, E. Central	612	6″	
July 12,	Parkwood, from Martin West	591	6″	
Dec. 2,	Pennsylvania, Jean South	233	6″	

		Feet	Size
Aug. 27,	Perrien, Abbott to Gt. Lakes	650	6"
		70	6"
Feb. 11,	Peter Hunt, Gratiot to W. Newland	3,542	8"
Feb. 17,	Philadelphia W., Hamilton West	216	6"
Feb. 11,	Philadelphia W., Wilson West	93	6"
Oct. 26,	Philadelphia E. Russell	476	6"
Aug. 9,	Philadelphia E. Wilson to W. Same	509	6"
Dec. 1,	Phillip, Kercheval North	380	6"
Nov. 6,	Phillip, N. Essex	328	8"
May 26,	Phillips, N. Kercheval	296	6"
Apr. 24,	Pillard, Gd. River East	945	6"
May 17,	Piper, S. Freud	243	8"
Nov. 13,	Piper Blvd., N. Freud to S. Freud	234	8"
Dec. 30,	Plymouth, Pontchartrain to Monica	642	12"
	Pontchartrain, Plymouth North	480	12"
	Monica, Plymouth North	768	6"
	Plymouth, crossing Pontchartrain	15	6"
July 12,	Proctor, 498' N., Michigan North	73	8"
Dec. 18,	Pumping Station grounds from No. 10 group to east of driveway at Main Entrance	943	48"
	Jefferson Pumping Station to E. of Seyburn Ave	5,453	48"
Jan. 8,	Quincy, Gd. River North	1,360	8"
July 20,	Rademacher, 327' N., Lafayette North	63	8"
Sept. 25,	Rademacher, N. Lafayette	61	8"
Nov. 12,	Rademacher, N. Lafayette North	205	8"
July 21,	Richmond, Euclid South	131	6"
May 24,	Rieden, Dix South	208	6"
Sept. 2,	St. John, Central to E. Ewers	1,220	6"
May 11,	St. John, Larkins West	112	8"
Apr. 28,	St. Joseph, Gratiot West	170	6"
Aug. 28,	Second, Jefferson to Front	208	10"
July 26,	Senator, Green East	258	6"
	Navy, Green East	443	8"
	Green, Ferndale to Navy	817	8"
July 20,	Senator, Central East	235	6"
Aug. 31,	Senator, E. of Central	269	6"
May 31,	Seneca, S. Canfield	90	8"
Aug. 17,	Seneca, S. Canfield	49	8"
Aug. 20,	Seneca, Moffat North	82	8"
Nov. 11,	Seward, E 14th	146	8"
Aug. 31,	Seward, 14th East	180	6"
Jan. 15,	Seward, 298' E., 14th East	147	8"
May 16,	Sharon, Mandale North	455	6"
July 2,	Solvay, 136' S. of M. C. R. R., N	156	4"
Nov. 29,	Springle, Kercheval North	1,145	6"
May 24,	Stair, N. Ferndale	717	8"
Mar. 7,	Sterritt, Gratiot East	753	8"
July 30,	Stone, E. of Woodmere East	79	6"
Mar. 1,	Strong, Carrie East	185	6"
Feb. 16,	Strong, W. Bellevue to Foster	342	8"
	Foster, Strong North	437	6"
July 23,	Taylor, Hamilton to Twelfth	2,658	24"
	Wilson, crossing Taylor	51	6"

		Feet	Size
	Hazelwood, Hamilton to Third	925	24″
	Schmittdiel, crossing Taylor	51	6″
	Hamilton, Taylor to Hazelwood	290	24″
Nov. 8,	Tennessee, N. Freud South	342	8″
Jan. 21,	Tennyson, 112′ N., Freud South	1,175	8″
Jan. 10,	Thaddeus, 815′ W. Harbough West	482	6″
Nov. 16,	Thaddeus, W. Harbough	485	6″
Nov. 21,	Thornton, Milford North	265	6″
Nov. 11,	Three Mile Drive, St. Paul South	100	6″
	Three Mile Drive, St. Paul to Mack	3,070	8″
	Three Mile Drive, Jefferson to Lakeside Drive	1,204	6″
	Lakeside Drive, E. & W., Three Mile Drive	593	6″
Jan. 22,	Vancouver, 628′ W., Ironwood West	153	8″
Nov. 6,	Torrey Ct., N. of Jackson	254	6″
Nov. 11,	12th, Lamothe North	120	8″
Apr. 13,	Twelfth, Burlingame to Webb	409	8″
	12th, Elmhurst to Webb	757	12″
	Elmhurst, 12th to Oakman	639	12″
	Elmhurst, Oakman East	652	8″
	Oakman, Elmhurst to Highland	1,214	10″
	Oakman, Kendell to Highland	3,938	8″
	Monterey, E. & W. Oakman	1,272	6″
	Richton, E. & W. Oakman	1,277	6″
	Cortland, E. & W. Oakman	1,264	6″
	Highland, E. & W. Oakman	1,304	8″
	Gray, E. & W. Oakman	1,047	6″
	Leslie, E. & W. Oakman	1,559	6″
	Glendale, E. & W. Oakman	1,352	6″
	Tyler, E. & W. Oakman	1,299	6″
	Waverley, E. & W. Oakman	1,303	6″
	Davison, E. & W. Oakman	1,312	8″
	Clements, E. & W. Oakman	1,336	6″
	Grand, E. & W. Oakman	1,320	6″
	Pasadena, E. & W. Oakman	1,316	6″
	Ford, E. & W. Oakman	1,323	6″
	Kendell, E. & W. Oakman	1,310	6″
	LaBelle, E. & W. Oakman	1,311	8″
	Buena Vista, Oakman East	695	6″
	Buena Vista, Oakman West	668	8″
	12th, Buena Vista North	243	8″
	Indiandale, 12th West	241	6″
	Glendale, 12th West	220	6″
	12th, Glendale to Buena Vista	287	6″
	Buena Vista, 12th West	227	6″
Feb. 4,	Underwood, Gd. River West	2,080	6″
Mar. 25,	Vancouver W., Ironwood West	275	8″
Jan. 22,	Vancouver, 628′ W., Ironwood West	153	8″
July 13,	Vancouver, 450′ W., Ironwood West	180	8″
July 7,	VanDyke, Harper to N. VanDyke	951	6″
	Hardyke, VanDyke East	543	6″
	Malvern, VanDyke East	449	6″ b
Aug. 14,	Vicksburg, Linwood West	382	8″
	A. S. Nicolet, Linwood East	309	6″

		Feet	Size
Aug. 25,	Virginia, 12th West	276	6"
July 6,	Virginia Parks from 12th East	668	6"
July 19,	Wabash, Ferry Park to Blvd	403	6"
May 6,	Wagner, Mt. Elliott to Girardin	2,877	8"
Nov. 26,	Waldo E. Parkinson	252	6"
May 22,	Wellington, East Greeley	12	6"
Oct. 26,	Westminister, East Greeley	238	12"
Oct. 19,	Willard, Maxwell West	79	6"
	Maxwell, Willard North	175	8"
July 28,	Wilson, Bethune South	201	8"
Jan. 4,	Woodmere, Pearl East	104	6"
May 20,	Woodmere, Wendell to Phillips		
	Phillips, Woodmere South	495	6"
July 11,	Woodrow, 55′ S., Moore Place N	400	8"

aVillage of Hamtramck; bTownship of Hamtramck; cVillage of Grosse Pointe Parks; dTownship of Grosse Pointe; eTownship of Greenfield; fVillage of Oakwood and gVillage of St. Clair Heights.

STORAGE YARD

The Storage Yard is the center of activities for all construction work on the distribution system, including storage and distribution of materials, supplies and equipment required in pipe laying work; repair of breaks or leaks; tapping mains for service connections; testing, setting and repairing meters, and all other work of a similar nature. All detailed accounting and bookkeeping pertaining to these various branches of the work also is done at the storage yard.

The accompanying tabulations show the character of the operations performed and the distribution of the costs.

Division of Storage Yard Labor

Loading, unloading, storing and checking materials	$ 9,905.16
Cleaning, trimming and plugging salvaged pipe and special castings	48.31
Watching and care of yards, buildings and equipmet	5,639.19
Caring for stables, wagons and harness	3,010.25
Night, Sunday and holiday emergency crews	9,073.01
Repairing and maintaining motor vehicles and other gasoline driven equipment	2,791.57
Repairing wagons and harness	76.44
Horseshoeing	389.01
Repairing and maintaining tools and equipment	8,444.18
Superintendence and clerical work	14,223.28
Special jobs	766.68
	$54,367.08

General Work, Year Ending June 30th, 1916

	Material	Labor	Total
Tapping mains and inserting 5,149 ⅝", 1,663 ¾", 2,031 1", 13 1½" and 13 2" service cocks and discontinuing 144 ⅝" and 41 1", also setting 99 2", 58 3", 30 4", 21 6" and 5 8" sleeves and valves for service	$10,012.56	$ 5,999.86	$16,012.42
Public drinking fountains set (3)	94.45	70.14	164.59
Examining, repairing and maintaining gates and wells	3,670.60	2,726.11	6,396.71
Repairing leaks and breaks in mains (132)	872.06	2,449.11	3,321.17
Attending to leaks on service connections (374)	462.86	1,442.50	1,905.36
Responding to false reports of leaks (159)	82.61	110.66	193.27
Opening blow-offs to flush dead-ends	296.29	2,036.33	2,332.62
Shutting service connections on account of leaks and non-payment and letting on same	84.73	196.27	281.00
Examining fire plants, air chambers, hydraulic elevators, river connections, setting pressure gauges and reading pressures	418.67	1,595.73	2,014.40
Curing no water and short supply complaints	172,24	545.67	717.91
Repairing sunken trenches and damaged walks and lawns	98.03	392.30	490.33
Caring for drinking fountains	195.92	756.63	952.55
Setting hydrants—Billed Village of Ecorse	83.28	18.18	101.46
Layinf 4" and 6" pipe in Riverside Park, foot of Morrell St.—Billed Dept. Parks and Blvds.	526.95	149.91	676.86
Setting hydrants—Billed Village of Grosse Point Parks	992.12	348.21	1,340.33
Maintainence of Main Office building and equipment	5.46	25.32	30.78
Yard cartage and expressing to stores	741.83	1,330.48	2,072.31
Operation and maintenance of yards and buildings	69.27	5,639.19	5,708.46
Yard supplies and expense	2.05	....	2.05
	$18,881.98	$25,832.60	$44,714.58

SERVICES AND METERS

New service taps to the number of 9,082 were made during the year and 185 old taps were removed, making a net increase of 8,897, and giving a total of 132,030 service connections of all sizes in the system. The taps made during the year, and the total number in use at the close of the fiscal year were as follows:

Size	Installed	Removed	Net Increase	Total in System
⅝" Service Cocks	5149	144	5005	92061
¾" Service Cocks	1663		1663	2077
1" Service Cocks	2031	41	1990	35082
1½" Service Cocks	13		13	13
2" Service Cocks	13		13	13
2" Sleeve and Valve	99		99	1365
3" Sleeve and Valve	58		58	765
4" Sleeve and Valve	30		30	430
6" Sleeve and Valve	21		21	203
8" Sleeve and Valve	5		5	18
10" Sleeve and Valve				2
12" Sleeve and Valve				1
Totals	9082	185	8897	132030

The ¾-inch, first introduced here last year, is being more generally used. The use of 1½-inch taps on mains six inches in diameter and larger, and of 2-inch taps on mains eight inches in diameter and larger was inaugurated this year.

All new service connections were metered and in addition about 9,000 old services were equipped with meters. A total of 21,364 new meters were set, and 3,553 were removed, making a net increase of 17,811 meters, and a total of 46,991 meters in service.

All meters are carefully tested before being set, and other meters in service are tested occasionally. The following tables give in detail the number of meters of all sizes set during the year, and the total number in service; the cost of testing meters, and the cost of installing meters. The figures of average cost of installing meters include the full cost of the meter.

Number of Meters Set, Year Ending June 30th, 1916

	⅝"	¾"	1"	1½"	2"	3"	4"	6"	8"	10"	16"	Ind.	Total
In service July 1, 1915	16258	8114	2809	722	679	271	194	97	5	1	1	29	29180
Set during year ending June 30, 1916	14055	5955	1119	95	97	23	16	4	..	..	..	..	21364
Total	30313	14069	3928	817	776	294	210	101	5	1	1	29	50544
Removed during year ending June 30, 1916	2083	1057	362	21	24	2	2	1	..	..	..	1	3553
Net gain	11972	4898	757	74	73	21	14	3	..	..	..	1	17811
Total in service July 1, 1916	28230	13012	3566	796	752	292	208	100	5	1	1	28	46991

Cost of Installing Meters, Year Ending June 30, 1916

Size	Number	Labor and Cartage	Material	Total	Ave. Labor and Cartage	Ave. Material	Ave. Cost
⅝"	(8072 (4.20) (3900 (5.10)	$2,753.56	$53,792.40	$56,545.96	$0.23	$ 4.49	$ 4.72
¾"	(2069 (6.50) (2829 (7.30)	1,126.54	34,100.20	35,226.74	.23	6.96	7.19
1"	(706 (9.30) (51 (9.12)	174.11	7,030.92	7,205.03	.23	9.29	9.58
1½"	(74 (21.00)	103.23	1,554.00	1,657.23	1.40	21.00	22.40
2"	(47 (35.00) (26 (32.50)	101.84	2,490.00	2,591.84	1.40	34.11	35.50
*3"	21					60.00	60.00
*4"	14					120.00	120.00
*6"	3					250.00	250.00

*Set by consumer.

Cost of Meter Testing, Year Ending June 30th, 1916

Sizes	Number	Flows	Cost	Average
⅝"	11,505	Full to 1/16"	$ 977.99	$ .08½
¾"	5,650	“ “ 1/16"	480.28	.08½
1"	750	“ “ 1/16"	105.12	.14
1½"	114	“ “ ⅛"	53.60	.47
2"	102	“ “ ⅛"	47.98	.47
3"	21	“ “ ⅛"	44.18	2.10
4"	13	“ “ ⅛"	27.36	2.10
6"	6	“ “ ⅛"	12.62	2.10
	18,161		$1,749.13	

Kind of Meters in Service, Year Ending June 30th, 1916

	⅝"	¾"	1"	1½"	2"	3"	4"	6"	8"	10"	16"	Ind.	Total
Crown			3										3
Hersey Rotary			7	2	1								10
Hersey Detector						1	8	19	5	1			34
Hersey Disc F.	11	5	2										18
Hersey Disc D.	13	3		12	15	5	7	1					36
Hersey Torrent						5	3	3					11
Hersey Worth Pist.		1	2		1	1							5
American	36	11	7	6	2								62
Keystone	29	8	5	3	2		2						49
King	32	9	3	2	3								49
1912 Watch-Dog, con.	1,883*	206	83	36	71								2,279
1916 Watch-Dog, con.	7,165**	1,601											8,766
Worthington	6,165	3,269	1,028	131	130	58	54	34					10,869
Thomson	4,527	1,628	1,452	485	457	195	118	42					8,904
Nash	8,369	6,271	973	119	69	27	14						15,842
Nilo					1		1						2
Eureka							1	1					2
Indicator												28	28
Neptune			1										1
Crest Trident											1		1
	28,230	13,012	3,566	796	752	292	208	100	5	1	1	28	46,991

*235 rev.
**300 rev.

PUMPING STATION AND GROUNDS

The work of laying out new walks and roadways in the grounds of the new Pumping Station was continued intermittently during the year, and an endeavor made to improve the grounds generally, the work being hampered by the construction of connections to the 48 inch Jefferson Avenue main.

The Chlorination House which was started the latter part of the previous year, was completed, and the liquid chlorine treatment started on partial service in January, 1916, and in full service in March, 1916.

The work on the four Screen Houses was started early in the year, but the cleaning of the basin caused an interruption to this work, and delayed operations sufficiently to prevent their completion. Several of the screens are in place, so that no interference will be caused to the supply from the basin to the water galleries.

An eight foot diameter brick tunnel to connect the ten foot tunnel with the water gallery of the new Pumping Station was commenced in March, 1915, and work on this structure had to be discontinued on account of the cleaning of the settling basin. Upon completion of the latter, the work was resumed, and the tunnel and connections finished, and placed in service in February, 1916.

The work of cleaning the settling basin was started in July, 1915, and was completed early in November, 1915. In addition to removing the deposit of sediment which has accumulated over a period of nearly forty years, it was necessary to remove a large timber and stone baffle or bulkhead at the southerly end, and to repair and lower some of the intakes and outlets, and construct new ice shields. Approximately 40,000 cubic yards of mud was removed, the depth of the basin being thereby increased three and one-half feet.

Accumulations of ice in the ports of the Intake Crib caused a shortage of water through the 10 ft. tunnel on three occasions in January, 1916. A study of conditions at the Crib disclosed the fact that the two 5 feet ports, which have the perforated steam pipes around the outer edge, were equipped with heavy cast iron hinged gates which apparently had never been opened. These gates were raised and chained open, and a permanent connection made to the steam pipe to facilitate turning steam into these ports from the fire boat.

NEW AND PROPOSED WORK

Intake Crib Fender

With a view to eliminating or minimizing the danger of interruption to the water supply to the intake tunnel the recommendation is made for the construction of a V-shaped timber fender at the up-stream end of the Intake Crib, as a diverter for ice and other floating material, and the removal of all the slated gratings from the four foot diameter ports of the Crib, on the theory that this fender will create a body of partially still water around the intake ports, and the removal of the gratings will decrease the tendency of needle ice to build up an obstruction at these points.

Pumping Engines

The rapid increase in population of Detroit, with the resultant increase in water consumption makes it imperative that additional pumpage facilities be considered, and with this in view I recommend that specifications be prepared and proposals requested on two new pumping engines having a capacity of approximately 37,000,000 gallons each. Pumping engines of this capacity will be practically counterparts of the present engines in the new station with a slight increase in diameters of the steam cylinders and the pump plungers. As the normal maximum capacity of a 48-inch main would be about 37,000,000 gallons, it would seem advisable to have pumping units of this capacity, rather than smaller. I also recommend the construction of a boiler house back of the new Pumping Station, having a capacity for six, six-hundred horse power boilers, and having one stack about ten feet in diameter and 225 or 250 feet high, the station to be equipped with overhead coal bunkers, having a capacity of approximately five hundred tons of coal, or a week's supply, and to be fed by conveyors from the coal storage sheds back of the old Pumping Station.

Additional Coal Storage

The necessity for additional coal storage capacity is apparent, as the present capacity of about 12,000 tons is just adequate to carry over the season of closed navigation and leaves a margin of less than one month's supply on hand in the spring. This is too close a margin for safety as a coal strike or railroad strike might interfere with early deliveries after navigation opens.

For this reason I recommend the construction of an additional section to the coal sheds back of the old Pumping Station, about 90 feet wide, which would add nearly 50 per cent. or about 6,000 tons to the present storage capacity.

Settling Basin

In order to eliminate the danger of local pollution to the water supply, I would recommend that the bottom and sides of the present settling basin be concreted, and means provided for cleaning it out readily. The bottom should be constructed so as to provide for a series of columns for supporting a concrete roof and the basin could either be covered now or at some future time. This basin after being covered, would constitute the clear water basin of any filtration plant which may be installed in the future. If covered now, the roof could be covered with dirt and sodded, forming an additional section of park area.

New Distributing Mains

With a view to providing for the normal increase in consumption on the high service system, I recommend that steps be taken to extend the 48-inch main on Garland Avenue northward to Gratiot Avenue and French Road to Lynch Road, and thence northwestwardly on Lynch Road, Mt. Elliott Avenue, Bloom Road, Conant Road and Six Mile Road to Log Cabin Avenue, and from there south with a 42-inch main to connect with the 36-inch main projected on Twelfth Street. Also to construct a 42-inch main on Dequindre Street, connecting the present 42-inch main on Holbrook, with the proposed 48-inch main at the Six Mile Road.

These large mains, if constructed as suggested, will provide an ample supply for the section embraced, and will permit of the further extension of a 42-inch main west of Twelfth Street to connect eventually with Grand River Avenue at or near the present westerly boundary of the city. Intermediate mains of moderate size, cross connecting with present main arteries will form a basis for the extension of all small mains in contiguous territory.

The difficulty of securing sufficient labor is becoming more apparent each month, and to offset this handicap, it is proposed to substitute machinery in every instance where it is possible to do so to advantage.

GENERAL

Attention is called to a table of statistics, appended hereto, in form recommended by the New England Water Works Association, giving a concise statement of the principal data regarding the Water Works System and its operation.

In closing the record of the year's operations, I desire to express my appreciation for the support and co-operation which I have received from the President, and members of the Board, and from the officers and employes of the Board in all matters affecting the welfare of the Water Works.

Very respectfully,

THEODORE A. LEISEN,
General Superintendent.

SUMMARY *of* STATISTICS

In form recommended by the New England Water Works Association.

Detroit Water Works,
Detroit, Wayne County, Michigan.

GENERAL STATISTICS.

Population by United States Census of 1910, 465,766.
Date of construction, 1827.
By whom owned. The Board of Water Commissioners of the City of Detroit.
Source of supply, Detroit River, near Lake St. Clair.
Mode of supply, pumping.

PUMPING STATISTICS.

Builders of pumping machinery—

- One 24,000,000 gallon, Compound Beam, Detroit Locomotive Works, Detroit, Michigan.
- One 24,000,000 gallon, Compound Beam, Riverside Engine Works, Detroit, Michigan.
- One 30,000,000 gallon, Compound Beam, Riverside Engine Works, Detroit, Michigan.
- One 24,000,000 gallon, Triple Expansion, E. P. Allis & Co., Milwaukee, Wis.
- Two 25,000,000 gallon, Triple Expansion, Allis Chalmers Co., Milwaukee, Wis.
- One 25,000,000 gallon, Triple Expansion, Holly Mfg. Co., Buffalo, N. Y.
- Three 30,000,000 gallon, Triple Expansion, Bethlehem Steel Co., South Bethlehem, Pa.

Description of fuel used—

a. Kind, bituminous, run of mine.
b. Brand of coal, Meadowbrook, W. Va.
c. Average price of coal, per gross ton (2,240 lbs.) delivered at Water Works $2.48
d. Percentage of ash, from Laboratory Analyses 7.8%
e. Wood, price per cord, none used.

Coal consumed for the year, 50,154,000 lbs.
Amount of other fuel used, none.
Total pumping for the year—

High Service	12,868,275,000 gallons
Low Service	33,820,674,000 gallons
Total	46,688,949,000 gallons

An allowance of 3% slip for all engines has been made in these quantities, and they represent the actual metered consumption.
Average static head against which pumps work—

High Service	65.7 lbs.,	151.8 ft.
Low Service	47.5 lbs.,	109.7 ft.
Whole System	52.5 lbs.,	121.3 ft.

Number of gallons pumped per pound of equivalent coal, 931.

$$\text{Duty} = \frac{\text{Gallons pumped x 8.34 (lbs.) x 100 x dynamic head}}{\text{Total Fuel Consumed.}} = 94,200,000$$

Cost of pumping, figured on pumping station expenses, $137,612.22.
Per million gallons pumped, $2.94.
Per million raised one foot (dynamic), $0.024.

STATISTICS OF CONSUMPTION OF WATER.

Estimated total population at date (City of Detroit)	734,562
Estimated population on lines of pipes	781,133
Estimated population supplied	781,133
Total consumption for the year	46,688,949,000 gallons
Passed through meters	24,632,230,000 gallons
Percentage of consumption metered	52.7%
Average daily consumption	127,565,434 gallons
Gallons per day to each inhabitant	163.3
Gallons per day to each consumer	163.3
Gallons per day to each tap	966
Cost of supplying water, per million gallons, figured on total maintenance	$7.22
Total cost of supplying water, per million gallons, figured on total maintenance plus interest on bonds	$8.78

STATISTICS RELATING TO DISTRIBUTION SYSTEM.

MAINS.

Kind of pipe, cast iron.
Sizes, from 2-inch to 48-inch.

Extended during year	259,671 feet	49.18 miles
Discontinued during year	5,044 feet	.95 miles
Total now in use	5,305,557 feet	1,004.84 miles
Cost of repairs per mile		$3.31
Number of leaks per mile		0.13
Length of pipes less than 4 inches diameter		10.22 miles
Number of hydrants (public) added during the year		313
Number of hydrants (public) now in use	7,064	and 193 H. P.
Number of cisterns now in use		517
Capacity of cisterns		3,780,000 gallons
Number of stop gates added during the year		502
Number of stop gates now in use		11,069
Number of blow-offs		838
Number of stop gates smaller than 4 inch		27

Range of pressure on mains, 16 lbs. to 66 lbs.

SERVICES.

Kind of pipe, lead and cast iron.	
Sizes, ⅝-inch to 12-inch.	
Number of service taps added during year	9,083
Number now in use	132,030
Average length of service, approximately 30 feet.	
Number of meters added	21,364
Number now in use	46,991
Percentage of services metered	35.6%
Percentage of receipts from metered water	56.0%

FINANCIAL STATISTICS.

RECEIPTS.

Assessment rates	$615,034.31	
Meter rates	784,126.45	
Delinquent, etc.	8,605.71	
Total from consumers		$ 1,407,766.47
Miscellaneous receipts	$149,734.82	
Interest	17,767.39	
		167,502.21
		$1,575,268.68

EXPENDITURES.

Water Works Maintenance—		
Operation, management and repairs	$336,857.63	
Interest on bonds	72,845.00	
	$409,702.63	
Depreciation account	146,785.96	
		$ 556,488.59
Balance		$ 1,018,780.09

Disposition of balance, devoted to construction work—	
Valuation of works	$12,859,714.19
Value of real estate	863,128.43
Bonded debt	1,947,000.00
Amount of Sinking Fund	100,115.58
Average rate of interest	3½%

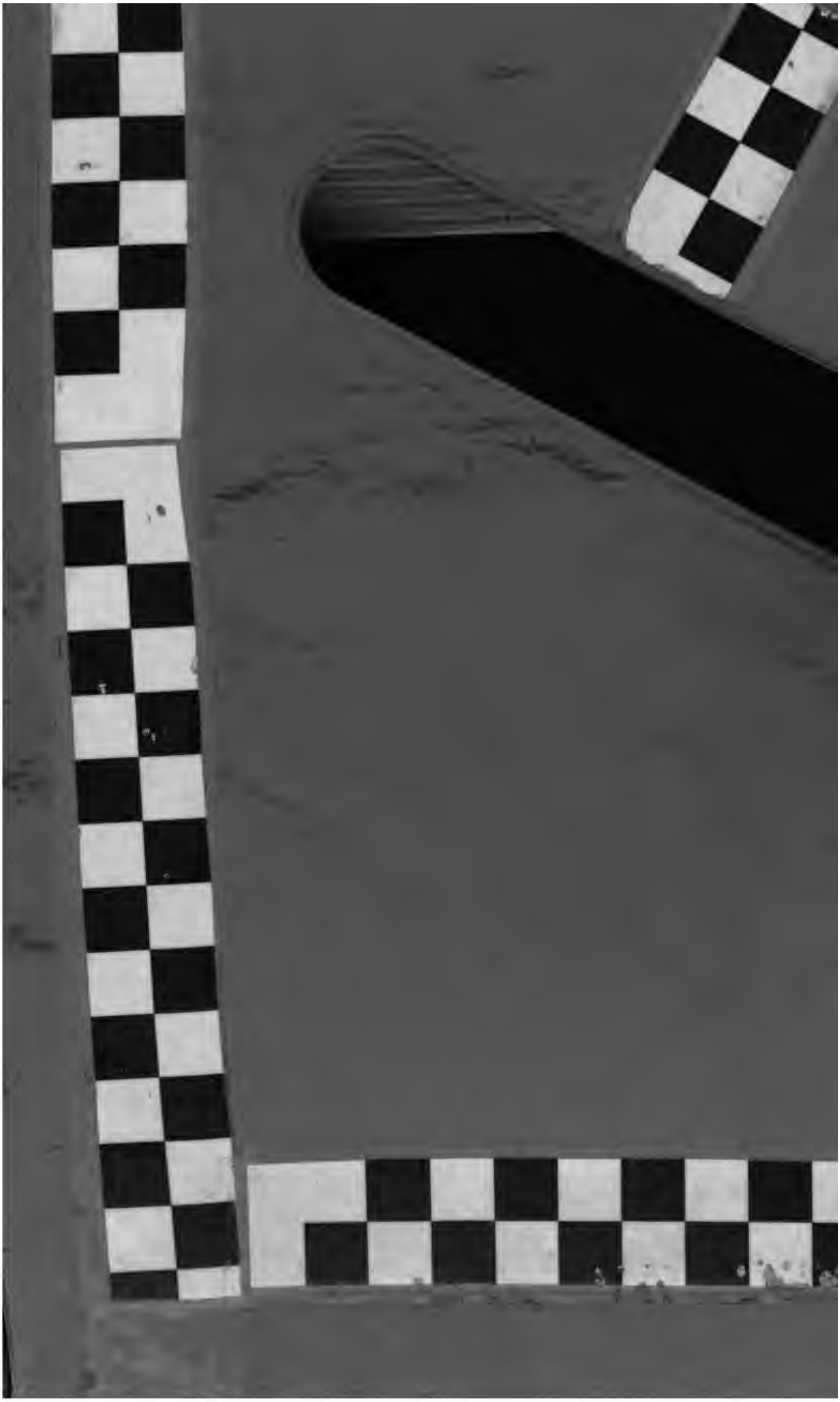
ROLL OF COMMISSIONERS AND THEIR TENURE OF OFFICE

James A. Van Dyke	1853	1855	Died.
Edmund A. Brush	1853	1868	Resigned.
Henry Ledyard	1853	1859	Resigned.
Shubael Conant	1853	1859	May 1st.
William R. Noyes	1853	1865	Resigned.
Alexander D. Frazer	1855	1871	May 1st.
Julius D. Morton	1859	1865	Died.
John V. Ruehle	1859	1861	Resigned.
Chauncy Hurlbut	1861—1863	1868—1885	Died.
Stanley G. Wight	1863	1868	May 1st.
Jacob S. Farrand	1865	1890	May 1st.
John Owen	1865	1879	May 1st.
Caleb Van Husan	1868	1872	May 1st.
Samuel F. Hodge	1871	1879	Resigned.
Elijah Smith	1872	1877	May 1st.
Michael Martz	1877	1887	May 1st.
James Beatty	1879	1885	Died.
John Pridgeon	1879—1884	1886—1891	May 1st.
Marshall H. Godfrey	1884	1889	Resigned.
Edwin F. Conley	1885	1886	May 1st.
Samuel G. Caskey	1885	1895	May 1st.
Joseph Nagel	1887	1890	Died.
August Goebel	1889—1894	1897—1898	Resigned.
Henry M. Duffield	1890	1895	May 1st.
Joseph L. Hudson	1890	1894	May 1st.
Frank E. Kirby	1891	1896	May 1st.
Albert L. Stephens	1894	1897	May 1st.
D. W. H. Moreland	1894	1896	Resigned.
Clarence A. Black	1894	1894	Resigned.
Edward W. Pendleton	1894	1909	May 1st.
Darius D. Thorp	1895	1905	May 1st.
John P. Huckestein	1896	1897	Resigned.
John W. McGrath	1896	1901	May 1st.
Joseph J. Noeker	1898	1902	May 1st.
James W. Millen	1897	1898	May 1st.
James Meathe	1898	1899	Died.
Benjamin Guiney	1899	1900	Resigned.

John Zynda	1900	1908	May 1st.
Joseph J. Crowley	1901	1906	May 1st.
John Schroder	1902	1907	May 1st.
John F. Dodge	1905	1910	May 1st.
Frederick J. Clippert	1906	1911	May 1st.
James H. Pound	1907	1912	Resigned.
Basil A. Lemke	1908	1913	May 1st.
James Wilkie	1909	1914	May 1st.
John Gillespie	1910	1913	Resigned.
Thomas F. Comerford	1913	1914	Resigned.
George Lane	1911	1916	May 1st.

MEMBERS OF THE BOARD, 1915-1916.

JAMES J. BRADY
EMIL STROH
ALEX. DOW
BENJ. F. GUINEY
ROBERT OAKMAN



e SIXTY-FIFTH
NNUAL REPORT
the Board of Water
mmissioners of
e City of Detroit

the Year Ending
June 30th, 1917

President, ROBERT OAKMAN

SIXTY-FIFTH ANNUAL REPORT

OF THE

BOARD *of* WATER COMMISSIONERS

OF THE CITY OF DETROIT

TO THE

COMMON COUNCIL *of* THE CITY *of* DETROIT

TOGETHER WITH THE REPORTS OF
THE OFFICERS OF THE BOARD

FOR THE YEAR ENDING
JUNE 30, 1917

DETROIT
THOS. SMITH PRESS
1918

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BOARD OF WATER COMMISSIONERS OF THE CITY OF DETROIT

MEMBERS

ROBERT OAKMAN, 1918
EMIL STROH, 1920
BENJ. F. GUINEY, 1919
ALEX. DOW, 1921
JOHN B. SOSNOWSKI, 1922

COMMITTEES

WAYS AND MEANS	Commissioners STROH and SOSNOWSKI
EXTENSION AND CONSTRUCTION	Commissioners SOSNOWSKI and DOW
WATER WORKS PARK	Commissioners DOW and GUINEY
SUPPLIES	Commissioners GUINEY and STROH

The President is ex-officio member of each committee.

OFFICERS

PRESIDENT	ROBERT OAKMAN
VICE-PRESIDENT	BENJ. F. GUINEY
SECRETARY	H. A. GILMARTIN
GENERAL SUPERINTENDENT	THEODORE A. LEISEN
PURCHASING AGENT AND PAYMASTER	H. S. STARKEY
AUDITOR	J. W. LOEFFLER
CHIEF ENGINEER AT PUMPING STATION	HARRY W. GOULD
BOOKKEEPER	GEORGE BARRIE
CASHIER	D. C. GROBBEL
PERMIT CLERK	LOUIS MONTGOMERY
CHIEF CLERK, RATE DEPARTMENT	WALTER C. BOWEN
CHIEF CLERK, METER DEPARTMENT	CHAS. F. GILMER

BOARD OF WATER COMMISSIONERS OF THE CITY OF DETROIT

METER RATES

Payable Quarterly	Quarterly
First 1,000 cubic feet per quarter, minimum charge	1 00
Next 3,000 cubic feet	**50 cts. per M.**
All additional	**30 cts. per M.**
Double rates outside of city.	

Assessment Rates

	Per Annum
For family, household purposes, each family	**$4 00**
Private stable, for each horse	**1 20**
Livery stable, for each horse	**1 20**
Dray and team horses, each	**1 00**
Cows, each	**1 00**
Boarding houses, in addition to family rate, each boarder or rommer	**50**
Estimated quantities of water, each 1,000 gallons	**07**
Automobiles, each	**1 20**
Bath tub, for families, each	**1 00**
Bath tub, public, each tub	**4 00**
Automatic water closets, for family, 1st closet	**2 00**
Automatic water closets, each additional	**60**
Rod water closets, not less than	**8 00**
Urinals, not less than	**2 00**
Wash hand basin, for family, each	**50**
Wash hand basin, for other purposes, each person	**15**
Hose bibb or connection, premises 30 feet front or less	**1 00**
Hose bibb or connection, premises 30 feet to 60 feet—	**1 40**
Hose bibb or connection, premises 60 feet to 100 feet	**2 00**
Special rates for larger grounds.	
Fountains	**$10 00 to 20 00**
Street sprinklers, each wagon	**50 00**

WATER RATES for BUILDING and CONSTRUCTION PURPOSES

Brick	**5c** per M.
Plaster	**7c** per 100 Sq. Yds.
Concrete	**$1.00** per 100 Cu. Yds.
Concrete 6" thick or less	**20c** per 100 Sq. Yds.
Tile	**5c** per 100 Cu. Ft.
Each perch stone	**1c**

	No Basement	Complete Basement
One story frame	**$ 50**	**$ 75**
Two story frame	**75**	**1 00**
One story brick	**75**	**1 00**
Two story brick	**1 00**	**1 25**
Two family frame	**1 00**	**1 50**
Two family brick	**1 50**	**2 00**

Where there is a waste of water an increase of rates will be made.

ANNUAL REPORT
THE BOARD OF WATER COMMISSIONERS OF THE CITY OF DETROIT

July 1, 1916 to June 30, 1917

TO THE HONORABLE
The Common Council of the City of Detroit.

Gentlemen:—

The Board of Water Commissioners of the City of Detroit respectfully presents its annual report for the fiscal year ending June 30, 1917.

The total receipts for the year were $1,984,486.04 and the total disbursements were $2,140,146.49. The total pumpage for the year was 52,040,254,250 gallons, an increase of 11½% over that of the previous year. The average daily consumption of water was 142,756,000 gallons, equal to a daily per capita consumption of 165 gallons, based on a population of 861,427 inhabitants for the City of Detroit and the environs supplied.

During the year 70 miles of new water mains were completed. The work of metering all service connections has been going forward steadily during the year, and on June 30, 1917, there were 65,542 meters in service.

During the past year, an experimental filtration plant with a capacity of 200,000 gallons per day, was constructed and is now in successful operation. The results so far obtained lead to the belief that filtration will satisfactorily deal with the problems of turbidity and bacterial reduction.

Report in detail of the work performed during the year follows:

Respectfully submitted,

ROBERT OAKMAN,
BENJ. F. GUINEY,
EMIL STROH,
ALEX DOW,
JOHN B. SOSNOWSKI,
Commissioners.

FINANCIAL STATEMENT

July 1, 1916			
Cash on hand			$ 5,076.34
Cash in Bank—			
General Fund		$292,953.60	
Outstanding Checks		39,457.65	
			253,495.95
Sinking Fund			100,115.58
Hurlbut Fund			1,536.82
Secretary Fund		$ 923.00	
Outstanding Checks		127.65	
		795.65	
Cash on Hand		204.35	
			1,000.00
			$ 361,224.69
Receipts for year ending June 30, 1917			1,984,486.04
			$2,345,710.73
Disbursements for year ending June 30, 1917			2,140,146.49
Balance—			
Cash on hand		$ 4,949.63	
Cash in Bank—			
General Fund	$ 88,168.00		
Outstanding Checks	1,172.65		
		$ 86,995.35	
Sinking Fund		106,172.58	
Hurlbut Fund		6,446.68	
Secretary Fund	210.94		
Outstanding Checks	16.00		
	194.94		
Cash on Hand	805.06		
		1,000.00	
			$ 205,564.24

FIRST AND OLD DETROIT NATIONAL BANK

BOARD OF WATER COMMISSIONERS,
Detroit, Mich.

Gentlemen:—

This is to advise you that the balance standing to the credit of the following accounts as shown on our books at the close of business June 30th, 1917, was as follows:

Secretary Fund	$ 210.94
Sinking Fund	106,172.58
General Fund	88,168.00
Hurlburt Fund	6,446.68

Yours very truly,

W. E. WINCKLER,
Auditor.

Cost of Water Service Operations for the Year Ending June 30th, 1917

Pumped per Meters at Pumping Station, 52,040,254,000 gals.

			Per Million Gallons
PRODUCTION COST			
Collection and Purification System:			
Chemical treatment	$ 20,682.96		
Maintenance of collection and purification plant	852.72		
Depreciation of collection and purification plant	7,859.20		
Direct cost of collection and purification plant		$ 29,394.88	$0.56
Steam Power Cost:			
Fuel for pumping	$ 88,766.88		
Wages of firemen and helpers	37,786.95		
Boiler house supplies and expense	24.73		
Maintenance of power plant and buildings	4,346.49		
Depreciation of power plant and buildings	8,068.44		
Direct steam power cost		138,993.49	2.67
Cost of Operating Pumps:			
Wages of assistant engineers and helpsers	$ 40,409.85		
Oils, waste and supplies	4,160.67		
Maintenance of pumping plant and buildings	2,345.19		
Depreciation of pumping plant and buildings	28,416.32		
Direct cost of operating pumps		75,332.03	1.45
Superintendence and general expense		3,699.15	.07
Proportion of Overhead Expense:			
Proportion of engineering department expense	$ 5,946.03		
Proportion of administration and general expense	256.51		
Total proportion of overhead expense		6,202.54	.12
Total cost of water delivered to mains		$ 253,622.09	$4.87
DISTRIBUTION COST			
Distribution System Cost:			
Repairing main leaks	$ 6,837.18		
Repair and maintain gates and wells	4,667.64		
Flush mains and blow off dead ends	2,423.11		
Repair trenches, walks and lawns	4,604.47		
Depreciation of pipe lines	121,919.75		
Depreciation of emergency station	209.80		
Direct distribution cost		$ 140,661.95	$2.70

Service Cost:			
Repairing service leaks	$ 2,558.03		
Repair and maintain drinking fountains	1,822.95		
False reports of leaks	420.09		
No water and short supply	1,214.47		
Shut-off and let-on	371.26		
Miscellaneous inspection	1,042.60		
Direct service cost		7,429.40	.11
Total direct distribution cost		$ 148,091.35	$2.84
Proportion of Overhead Expense:			
Proportion of storage yard expense	$ 19,685.77		
Proportion of engineering department expense	6,317.65		
Proportion of administration and general expense	39;341.16		
Total proportion of overhead expense		65,344.58	1.26
Total distribution costs		$ 213,435.93	$4.10

METER SERVICE COSTS

Meter Department Cost:			
Repair and maintain meters	$ 12,889.06		
Remove and replace meters	3,989.10		
Depreciation of meters	5,414.08		
Direct meter cost		22,292.24	
Proportion of overhead expense:			
Proportion of storage yard expense	$ 5,581.00		
Proportion of administration and general expense	70,188.27		
Total proportion of overhead expense		75,769.27	
Total meter service costs		$ 98,061.51	$1.88

SUMMARY

Total cost of water delivered to mains	$ 253,622.09	
Total distribution cost	213,435.93	
Total cost of water pumped and delivered	$ 467,058.02	
Total meter cost	98,061.51	
Total cost	$565,119.53	$10.85

CONSTRUCTION REPORT

Year Ending June 30th, 1917

Work in Process June 30, 1916		$ 504,773.13
Pay Rolls	$ 287,133.00	
Materials	1,108,167.81	
Cartage	30,777.95	
		$1,426,078.78
Overhead Expense—		
Storage Yard Expense	67,640.12	
Engineering Dept. Expense	24,898.99	
Administration and General Expense	9,149.63	
		$ 101,688.74
		$2,032,540.65
Complete Work Transferred to Plant Accounts—		
Water Mains, Gates and Wells	648,407.50	
Collection and Purification Plant	23,282.61	
Water Works Park Improvement	5,759.55	
Pumping Plant, No. 2	4,679.86	
Power Plant	342.53	
Miscellaneous	1,907.61	
		$ 684,379.66
Work in Process June 30, 1917		$1,348,160.99

NET REVENUES

Year Ending June 30th, 1917

Water Service Operations—		
Assessment Rates	$ 520,432.76	
Meter rates	1,025,932.82	
Shutting off and letting on	382.75	
Percentages on delinquent accounts	9,178.70	
Total revenue from water service	1,555,927.03	
Cost of water service operations	565,119.53	
Net gain from water service operations		$ 990,807.50
Miscellaneous Revenue—		
Estimates paid for pipe lines	65,906.83	
Sale of service connection construction	5,036.19	
Bonuses for pipe laid on petition	67,752.90	
Meter Bonuses	10,943.84	
Miscellaneous receipts	4,411.86	
Interest earned on General Fund	11,718.04	
Interest earned on sinking fund	3,714.50	
Plumbers license	1,214.50	
Sale of work and material	13,110.74	
		$ 183,809.40
		$1,174,616.90
City of Detroit general tax levy	$ 75,000.00	
Interest on bonded indebtedness	72,845.00	
		$ 2,155.00
Income from the Trustees of the Hurlbut fund		$ 4,909.86
		$1,181,681.76
Water Works Park expense	$ 24,544.97	
Expenses guarding pumping station	12,049.52	
		$ 56,594.49
Net gain for year ending June 30, 1917		$1,145,087.27

BALANCE SHEET

Year Ending June 30th, 1917

ASSETS

Current Cash and Bank Accounts:	
Current cash	$ 4,949.63
Cash in Bank:	
General Fund	86,995.35
Hurlbut Fund	6,446.68
Secretary's Fund, bank balance and cash on hand	1,000.00
	$ 99,391.66
Accounts Receivable:	
Meter rates	$ 87,530.35
Assessments rates	4,717.01
Miscellaneous	5,359.69
Total accounts receivable	$ 97,607.05
Inventories:	
Stores and supplies at yard	$ 223,591.13
Coal at pumping station	2,579.75
Construction work in process	1,348,160.99
Equipment	176,139.63
Total inventories	$ 1,750,471.50
Plants:	
Collection and purification plant	$ 578,430.49
Steam power plant	297,842.48
Pumping plant No. 1	1,016,705.23
Pumping plant No. 2	1,005,715.99
Water mains, gates and wells	12,146,219.10
Meters in service	577,705.30
Public drinking fountains	8,981.45
Storage yard buildings and improvements	84,759.38
Emergency station	15,723.91
Main office building	54,288.00
Water Works Park improvements	159,103.67
	$15,945,475.00
Less reserve for depreciation	2,491,100.73
Total value of plants	$13,454,374.27
Real Estate	866,929.18
Sinking Fund	106,172.58
Total	$16,374,946.24

LIABILITIES, ETC.

Current Liabilities:	
Vouchers payable	$ 247,281.12
Interest accrued on bonds	23,198.47
1917-18 assessment	4,546.15
Accrued pay roll	4,239.84
Loan from 1st & Old Detroit National Bank	100,000.00
Unclaimed pay roll money	93.99
	$ 379,359.57
Special Liabilities:	
Liability to injured workmen	$ 3,715.24
Bonded Indebtedness	$ 1,947,000.00
Reserve:	
Sinking Fund	$ 106,172.58
Hurlbut Fund	6,446.68
	$ 112,619.26
Surplus	$13,932,252.17
	$16,374,946.24

BONDED INDEBTEDNESS

The following table shows the dates of issue and amount of bonds of this department outstanding at this date. The total amount issued by the Board during its existence is $3,990,000, of which $300,000 were refunded and $1,743,000 redeemed, leaving a balance due of $1,947,000.

				Rate of Int.	Redeemed Refund	Out-standing
1873	Jan. 10, 1895	Jan. 10, 1925	$ 100,000	4%		$ 100,000
1869	Feb. 1, 1900	Feb. 1, 1930	200,000	3½%	$ 20,000	180,000
1873	Jan. 1, 1903	Jan. 1, 1933	50,000	3½%		50,000
1873	Sept. 1, 1903	Sept. 1, 1933	150,000	3½%		150,000
1901	June 1, 1904	June 1, 1934	200,000	3½%		200,000
1901	Aug. 1, 1904	Aug. 1, 1919	100,000	4%		100,000
1901	Feb. 1, 1905	Feb. 1, 1935	150,000	3½%		150,000
1901	Aug. 1, 1908	Aug. 1, 1938	250,000	3½%	75,000	175,000
1901	July 1, 1909	July 1, 1939	200,000	3½%	98,000	102,000
1901	Oct. 1, 1912	Oct. 1, 1932	240,000	4%		240,000
1913	Mar. 1, 1914	Mar. 1, 1944	500,000	4%		500,000
			$2,140,000		$193,000	$1,947,000

REPORT OF THE GENERAL SUPERINTENDENT

TO THE BOARD OF WATER COMMISSIONERS OF THE CITY OF DETROIT.

Gentlemen:—In conformity with established custom, I submit herewith the Annual Report of the Engineering, Construction and Operating Departments for the fiscal year ending June 30, 1917, embracing in a general brief review the results of work carried out by these branches of the service, including tabulated statements of certain results, and more detailed information regarding the pumpage of water and of work on the distribution system.

PUMPAGE AND DISTRIBUTION.

All of the statements of water pumpage or consumption, are based on the records of the venturi meters, representing approximately three (3%) per cent less than the quantity determined by plunger displacement, which covers all losses due to pump slippage and all water used in and about the pumping stations which does not pass through the venturi meters.

The total pumpage for the current fiscal year amounted to 52,040,254,250 gallons, of which 38,275,113,750 gallons was distributed through the low service system, and 13,765,140,500 gallons through the high service. The total pumpage for the year shows an increase of eleven and one-half (11½%) per cent over the records of the previous year, as compared with an estimated increase of ten and one-quarter (10¼%) per cent in the population supplied.

The average daily consumption for the entire system was 142,576,039 gallons; equivalent to a per capita consumption of 165 gallons per diem, based on an estimated population of 861,427 inhabitants for the City of Detroit and the environs supplied.

The rapidly increasing number of meters being installed should have an appreciable effect in the next few years in reducing the per capita consumption. The number of metered services was increased from 46,991 in 1916 to 65,542 in 1917, a net increase of 18,551 and the total quantity furnished through metered services was 29,509,010,557 gallons, or 56.7 per cent of the total consumption, and produced 66.3 per cent of the revenue derived from the sale of water.

The quantity of water utilized by the manufacturing plants, railroads, hotels and other business enterprises, which may be classified as industrial consumption, is estimated approximately at 18,000,000,000 gallons, or about 35% of the total consumption. The remaining quantity amounting to 34,000,000,000 gallons which may be designated as domestic consumption, includes all water used by residences, and for flushing and sprinkling streets, fire protection and incidental leakage and other unaccounted for quantities. This domestic consumption was equivalent to a daily per capita consumption of slightly over 100 gallons.

The maximum hourly rate of consumption occurred on July 26, 1916, attaining an equivalent daily consumption of 221,400,000 gallons, or 55 per cent above the average for the year. The minimum hourly rate occurred on December 4, 1916, and was equivalent to a daily consumption of 79,320,000 gallons.

Reports from the Fire Department for the year indicate a total consumption of 30,664,000 gallons for fire protection service, amounting to one seventeenth of one per cent of the total quantity pumped.

The following tables show the maximum and minimum figures and various other details of pumpage, both as measured by meters, and indicated by plunger displacement, including statement of quantities on both high and low service, by months and for the entire year.

COMPARISON OF METER AND PUMP RECORDS

	Meter Measurement	Plunger Displacement
Maximum day, Feb. 13, 1917	188,920,250	194,566,250
Minimum day, Dec. 3, 1916	106,993,500	109,925,300
Average daily (entire system)	142,576,039	147,462,090
Average daily (high service)	37,712,714	47,942,937
Average daily (low service)	104,863,325	99,519,153
Total for year	52,040,254,250	53,823,662,830
Maximum hour (entire system), July 26, 1916, 7:00 P. M. to 8:00 P. M	9,225,000	10,241,050
Maximum hour (high service)	2,925,000	3,408,910
Maximum hour (low service)	6,300,000	6,832,140
Minimum hour (entire system), Dec. 4, 1916, 3:00 A. M. to 4:00 A. M	3,305,000	3,410,280
Minimum hour (high service)	735,000	850,400
Minimum hour (low service)	2,570,000	2,559,880

Rate per day at maximum hour (entire system)	221,400,000	245,785,200
Rate per day at maximum hour (high service)	70,200,000	81,813,840
Rate per day at maximum hour (low service)	151,200,000	163,971,360
Rate per day at minimum hour (entire system)	79,320,000	81,846,720
Rate per day at minimum hour (high service)	17,640,000	20,409,600
Rate per day at minimum hour (low service)	61,680,000	61,437,120

PUMPAGE

Recorded by Venturi Meters

	HIGH SERVICE		LOW SERVICE		TOTAL	
Month 1916	Total Gallons	Daily Average Gallons	Total Gallons	Daily Average Gallons	Total Gallons	Daily Average Gallons
July	1,370,358,000	44,205,097	3,625,623,000	116,955,581	4,995,981,000	161,160,677
August	1,315,982,500	42,451,046	3,565,155,000	115,005,000	4,881,137,500	157,456,048
Sept.	1,170,177,500	39,005,917	3,247,965,750	108,265,525	4,418,143,250	147,271,442
Oct.	1,128,380,000	36,399,355	3,111,475,000	100,370,161	4,239,855,000	136,769,516
Nov.	1,010,262,500	33,675,417	2,814,766,000	93,825,533	3,825,028,500	127,500,950
Dec.	1,076,980,000	34,741,290	3,057,089,000	98,615,774	4,134,069,000	133,357,064
1917						
Jan.	1,167,845,000	37,672,419	3,306,830,750	106,671,960	4,474,675,750	144,344,379
Feb.	1,160,755,000	41,455,536	3,348,899,000	119,603,536	4,509,654,000	161,059,072
March	1,122,982,500	36,225,242	3,239,746,500	104,507,951	4,362,729,000	140,733,193
April	1,031,137,500	34,371,250	2,923,441,750	97,448,058	3,954,579,250	131,819,308
May	1,072,340,000	34,591,613	3,056,329,000	98,591,258	4,128,669,000	133,182,871
June	1,137,940,000	37,931,333	2,977,793,000	99,259,767	4,115,733,000	137,191,100
Year	13,765,140,500	37,712,714	38,275,113,750	104,863,325	52,040,254,250	142,576,039

The tabulation below shows the division of the water consumption and population in Detroit and the adjacent suburbs.

CONSUMPTION OF WATER IN DETROIT AND VILLAGES

	Total Consumption Gallons	Daily Average Gallons	Estimated Population
Detroit, unmetered	20,578,401,850	56,379,183	....
Detroit, metered	29,209,010,600	80,024,687	....
Detroit, total	49,787,412,450	136,403,870	808,327
River Rouge, metered	344,542,300	943,951	7,500
Ecorse, metered	86,475,500	236,919	2,700
Hamtramck, metered	1,405,494,200	3,850,669	30,500
Oakwood, metered	76,310,200	209,069	1,500
Grosse Pointe, metered	40,019,500	109,642	900
Greenfield, St. Clair Heights, etc.	300,000,000	819,672	10,000
Villages, total	2,252,841,800	6,172,169	53,100
Detroit, total	49,787,412,450	136,403,870	808,327
Total	52,040,254,250	142,576,039	861,427

Total, unmetered	20,878,401,850	57,201,101	....
Total, metered	31,161,852,400	85,374,938	....
Total pumpage	52,040,254,250	142,576,039	....

The pumping station records show an average station duty of 99,600,000 foot-pounds per 100 lbs. of coal consumed for all pumping engines, where all steam used for heating surrounding buildings, and on auxiliary engines used in construction and repair work near the station, is charged up against pumpage—an average of 953 gallons of water was pumped per pound of coal.

The actual cost of operating the pumping stations (exclusive of interest and depreciation) and the average cost per million gallons, is shown by the accompanying tabulations:

Cost of Pumpage

	Total Cost	Cost per Million Gallons	Cost per Million Gallons Raised 100 ft.
Labor	$ 81,895.95	$1.57	$1.26
Fuel	88,766.88	1.71	1.36
Oil and Supplies	4,185.40	.08	.06
Miscellaneous	6,691.68	.13	.10
Total	$181,539.91	$3.49	$2.78

The increased cost of fuel due to the abnormal conditions of the coal market during a portion of the year covered by this report is responsible for the increased cost as compared with the years immediately preceding.

QUALITY OF WATER

The character of both the river and the treated water has been remarkably good during current year, the bacterial counts and the positive tests of B. Coli both having been considerably below the records of previous years. The only treatment given to the water was by means of chlorination, the quantity of liquid chlorin used averaging about two pounds per million gallons of water treated; equivalent to one quarter of one part of chlorin per million parts of water.

The river water averaged 27 bacteria per c. c. on agar at 37 degrees, and confirmed evidence of B. Coli in 63 out of 589 samples of 1 c. c. and 866 out of 2945 samples of 10 c. c.

The treated water showed an average of seven bacteria per c. c. on agar at thirty-seven degrees, and confirmed evidence of B. Coli in only 16 out of 2945 samples of 10 c. c. and no positive indication in any of 589 tests of 1 c. c. samples. The cost of the chlorination treatment was approximately 40 cents per million gallons.

Daily bacterial analyses of River Water and Treated Water show the following results:

Average number of Bacteria per c. c.:
Gelatin at 20 deg.............. River Water, 60.2; Treated Water 9.6
Agar at 37 deg................. River Water, 27.6; Treated Water 7.5
Agar at 20 deg................. River Water, 61.6; Treated Water 9.2

RIVER WATER—

B. Coli in 1 C. C. sample—positive on 53 days—63 times in 589 tests.
B. Coli in 10 C. C. samples—positive on 172 days—866 times in 2945 tests.

TREATED WATER—

B. Coli in 1 C. C. sample—positive on 0 days— 0 times in 589 tests.
B. Coli in 10 C. C. samples—positive on 14 days—16 times in 2945 tests.

The accompanying Table "E" shows the monthly average results of bacterial analyses of the river water, treated water and tap water, and the turbidities in parts per million.

WATER PRESSURE

The average mean pressures maintained throughout the city were practically the same as for the preceding year, and resulted in very satisfactory service, and a more uniform pressure was kept up as indicated by the fact that the average of the extreme low pressures was greater than for the previous year, although the consumption was considerably greater. This result was due to the constantly increasing number of mains of large sizes.

A detailed statement of the pressures recorded at the several pressure stations throughout the city, is shown in the accompanying "Table of Pressures."

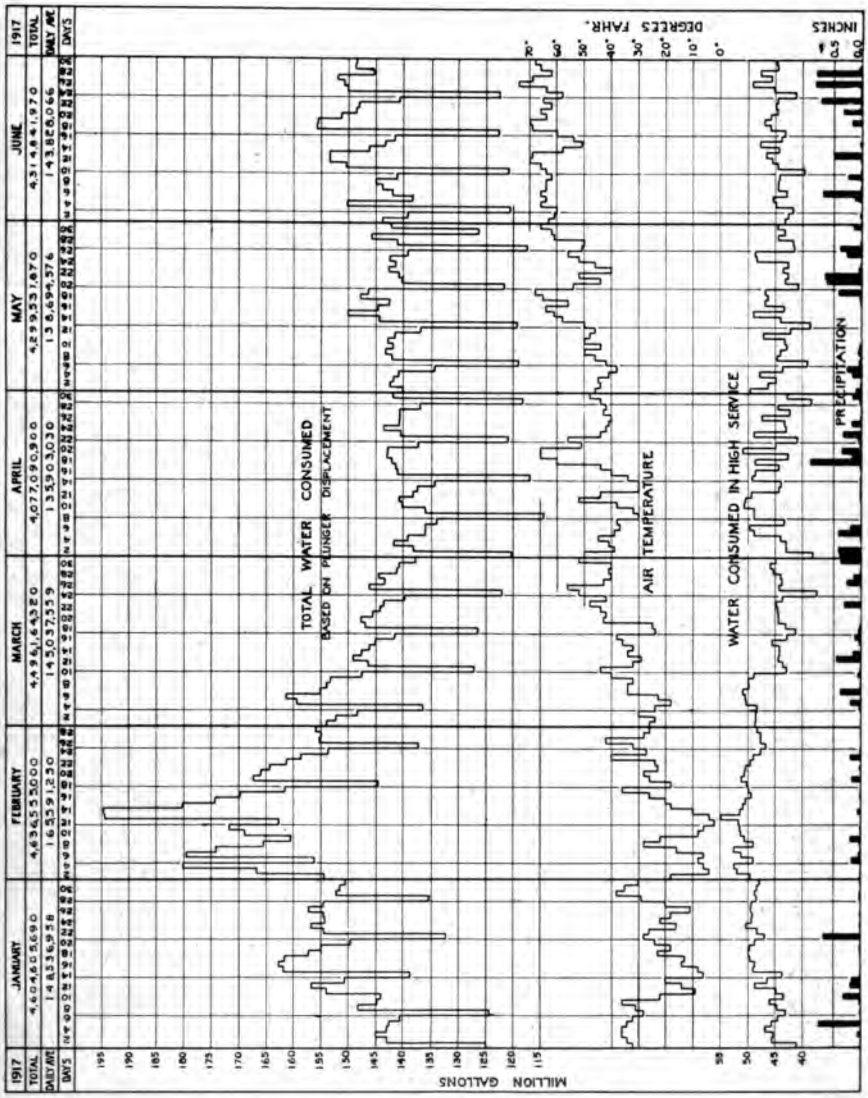
BACTERIAL ANALYSIS DETROIT WATER

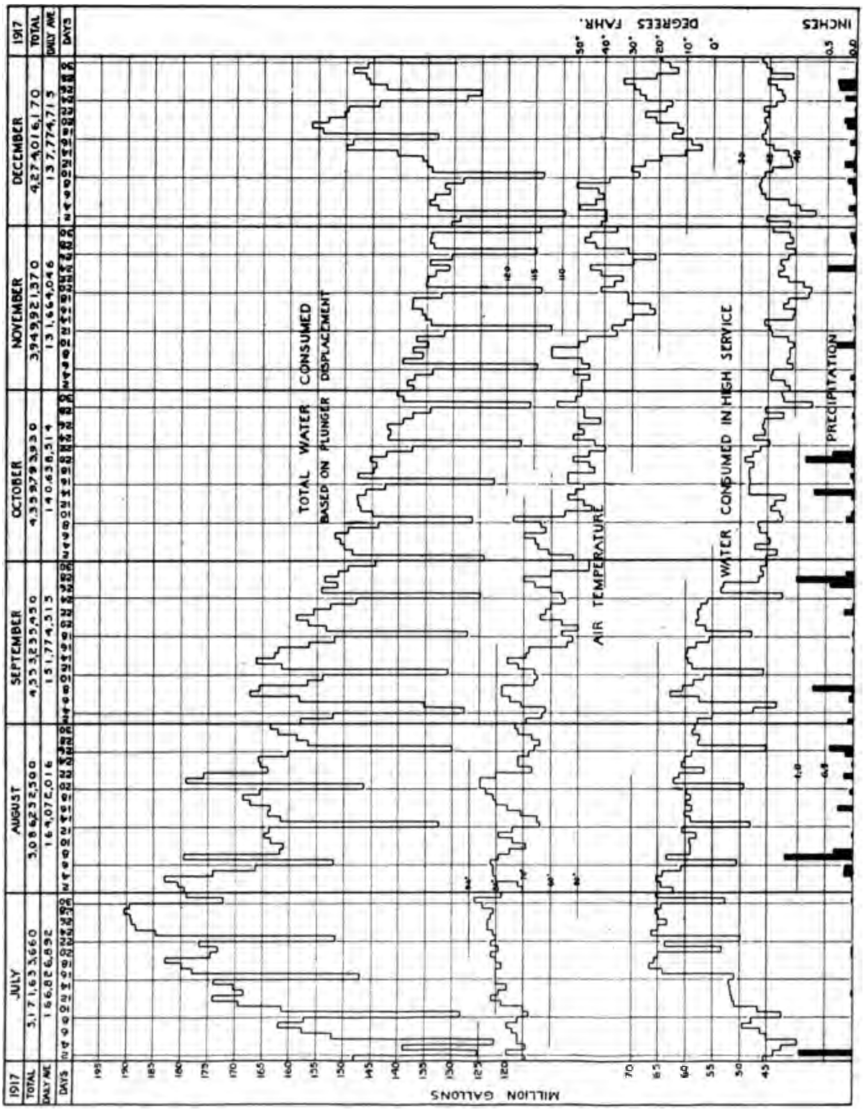
Summary of Monthly Averages—July, 1916-July, 1917

	RAW WATER							TREATED WATER							TAP WATER				
	Agar at 20°	Agar at 37°	Gelatin at 20°	B. Coli 1 c.c.	B. Coli 10 c.c.	B. Coli 100 c.c.	Turbidity	Agar at 20°	Agar at 37°	Gelatin at 20°	B. Coli 1 c.c.	B. Coli 10 c.c.	B. Coli 100 c.c.	Turbidity	Agar at 20°	Agar at 37°	Gelatin at 20°	B. Coli 1 c.c.	B. Coli 10 c.c.
July—1916	83.6	39.2	66.0	3/50	86/850	....	13.6	8.0	4.2	8.6	0/50	0/250	....	12	11.5	6.2	15.7	0/20	0/125
August	187.0	118.4	93.8	21/54	171/270	....	23.5	7.5	7.5	3.8	0/54	1/270	....	22	7.6	4.9	4.5	0/27	0/135
September	59.2	29.4	66.0	9/50	174/250	....	25.4	5.1	9.2	5.2	0/50	0/250	....	24	13.5	5.5	14.6	0/25	0/125
October	105.7	23.0	126.2	13/52	193/260	....	51.0	6.2	6.4	6.8	0/52	1/260	....	52	9.1	5.4	10.6	0/26	1/130
November	74.0	16.0	90.6	8/48	123/240	....	37.5	5.2	5.5	5.0	0/48	0/240	....	38	6.3	4.3	6.5	0/24	0/120
December	53.4	11.1	68.6	5/46	68/230	....	21.7	3.3	3.2	2.8	0/46	0/230	....	20	4.1	3.6	3.5	0/23	0/115
January—1917	12.0	4.3	15.0	1/42	12/210	....	1.3	1.8	1.8	1.9	0/42	0/210	....	1.2	1.9	1.8	1.7	0/21	0/105
February	4.4	2.8	4.5	0/44	0/220	....	0	1.3	1.2	1.4	0/44	0/220	....	0	1.5	1.1	1.8	0/22	0/110
March	22.9	19.2	25.6	0/52	3/260	....	6.7	8.4	14.3	11.0	0/52	0/260	....	4.4	12.2	16.6	13.5	0/26	1/130
April	87.4	38.4	109.0	0/50	4/230	....	26.2	42.0	22.0	47.2	0/50	1/250	....	25	43.8	24.6	47.3	0/25	1/125
May	36.0	20.4	41.3	35/1	14/255	....	34.0	12.7	13.0	13.8	0/51	6/255	....	25	22.6	11.8	22.9	0/26	2/130
June	13.8	9.5	15.4	0/50	17/250	....	15.0	7.8	7.1	8.1	0/50	7/250	....	11	37.0	10.1	39.3	0/26	8/130
Average	61.6	27.6	60.2	....	....	....	21.6	9.2	7.5	9.6	....	....	....	19.5	14.3	8.0	15.2	....	....
Total	....	....	....	63/189	866/2945	....	....	....	....	....	0/589	16/2945	....	....	....	....	....	0/291	13/1480

Table of Pressures.

	LOCATION OF GAUGES	Elevat'n above City Datum	Pressure Corresponding to diff. in Elevat'n between Pump Wells and Engine Gauges	July 1, 1915 to June 30, 1916. Average Daily Consumption 127,565,434 gallons Total Consumption for Year 46,688,949,000 gallons				July 1, 1916 to June 30, 1917 Average Daily Consumption 147,462,090 gallons Total Consumption for Year 53,823,662,830 gallons				Increase or Decrease in Friction During last Year		Maximum Hour observed July 26, 1916, 10,241,050 gals. 7 p. m. to 8 p. m. Daily Rate 245,785,200 gals.		Minimum Hour observed Dec. 4, 1916 3,410,280 gals. 3 a. m. to 4 a. m. Daily Rate 81,846,720 gals.	
				Pressures, Pounds			Fric. Loss Pounds	Pressures, Pounds			Fric. Loss Pounds	Pounds		Average Pressure Pounds	Fric. Loss Pounds	Average Pressure Pounds	Fric. Loss Pounds
		Feet	Pounds	High	Low	Mean		High	Low	Mean		Inc.	Dec.				
Low Service	Pumping Station	92.00	....	71	20	47.5	....	53	26	49.1	....	.....	.....	45.2	....	45.7	....
	Engine No. 32, Hart and Jefferson	103.42	4.9	47	24	39.9	2.7	44	24	37.6	6.6	3.9	.....	....	....	40.5	0.3
	Engine No. 26, Crane and Brinket	125.79	14.6	38	18	33.3	....	39	17	32.8	1.7	1.7	.....	30.0	0.6	32.5	....
	Engine No. 7, Concord, near Jefferson	124.77	14.2	37	15	31.5	1.8	35	12	30.8	4.1	2.3	.....	27.0	4.0	30.5	1.0
	Engine No. 19, Congress, near Jos. Campau	122.47	13.2	35	15	31.1	3.2	35	24	31.0	4.9	1.7	.....	25.0	7.0	31.0	1.5
	Engine No. 2, Hastings, near Congress	120.98	12.6	34	15	29.5	5.4	37	20	28.6	7.9	2.5	.....	28.0	4.6	31.0	2.1
	Water Office, Randolph and Jefferson	125.18	14.4	33	10	27.3	5.8	33	20	27.7	7.0	1.2	.....	....	....	28.5	2.8
	Engine No. 3, Griswold and Clifford	123.06	13.4	33	15	29.1	5.0	36	15	30.1	5.6	0.6	.....	30.0	1.8	31.0	1.3
	Engine No. 8, Sixth and Baker	122.14	13.1	36	14	28.9	5.5	34	22	29.0	7.0	1.5	.....	25.5	6.6	31.0	1.6
	Engine No. 4, Eighteenth, near Howard	116.18	10.5	34	15	29.9	7.1	34	22	30.0	8.6	1.5	.....	22.0	12.7	31.5	3.7
	Engine No. 10, Sixteenth and Bagg	125.28	14.4	34	12	28.0	5.1	33	17	28.4	6.3	1.2	.....	20.0	10.8	....	....
	Engine No. 15, Hubbard near Fort	114.62	9.8	38	17	31.8	5.9	38	24	31.7	7.6	1.7	.....	28.5	6.9	34.0	1.9
	Engine No. 29, Solvay and W. Jefferson	115.05	10.0	37	15	30.7	6.8	36	6	30.2	8.9	2.1	.....	20.5	14.7	31.0	4.7
	Truck No. 13, Fort and Lewerenz	115.56	10.2	38	16	30.2	7.1	36	18	29.6	9.3	2.2	.....	18.5	6.5	31.0	4.5
	Engine No. 27, Junction and Rogers	113.74	9.4	39	17	32.0	6.1	38	20	31.7	8.0	1.9	.....	20.5	15.3	34.5	1.8
	Engine No. 14, Scotten near Michigan	121.37	12.7	37	18	33.0	1.8	38	22	32.5	3.9	2.1	.....	22.0	10.5	36.5	....
	Engine No. 22, Michigan, near Hammond	119.14	11.8	36	16	28.6	7.1	34	19	28.1	9.2	2.1	.....	21.5	11.9	31.0	2.9
	Truck No 10, Sheridan and Mack	140.25	20.9	30	8	23.4	3.2	27	15	23.1	5.1	1.9	.....	15.5	8.8	23.0	1.8
	Engine No. 18, Mt. Elliott near Sylvester	146.23	23.5	26	5	21.4	2.6	27	13	20.9	4.7	2.1	.....	13.0	8.7	20.5	1.7
	Engine No. 11, Grandy, near Gratiot	143.21	22.2	29	8	24.1	1.2	27	13	22.5	4.4	3.2	.....	....	....	....	....
	Engine No. 6, High, near Hastings	142.63	21.9	25	13	20.1	5.5	29	14	19.9	7.3	1.8	.....	16.0	7.3	21.0	2.8
	Storage Yard, Orleans and Erskine	150.64	25.4	22	5	15.9	6.2	20	9	15.6	8.1	1.9	.....	9.5	10.3	17.0	3.3
	Truck No. 5, Russell and Erskine	147.74	24.1	22	2	17.8	5.6	29	10	17.0	8.0	2.4	.....	10.5	10.6	18.5	3.1
	Engine No. 5, Alexandrine, near Cass	148.48	24.5	23	1	18.6	4.4	24	10	18.1	6.5	2.1	.....	16.5	4.2	19.0	2.2
	Engine No. 12, Sixteenth and Grand River	141.55	21.5	27	3	20.1	5.9	25	12	20.4	7.2	1.3	.....	12.0	11.7	20.5	3.7
	Engine No. 31, Cobb and W. Grand Blvd	135.12	18.7	29	7	22.2	6.6	29	10	22.1	8.3	1.7	.....	10.0	16.5	....	....
	Engine No. 20, Baldwin and Gratiot	145.37	23.1	30	6	21.8	2.6	26	10	20.1	5.9	3.3	.....	12.0	10.1	23.0	....
	Average	....	....	.....	12.4	27.7	....	.....	16.9	26.5	....	.....	.....	....	....	....	....
High Service	Pumping Station	92.00	....	104	45	65.7	....	75	56	65.0	....	.....	.....	68.0	....	60.5	....
	Engine No. 18, Mt. Elliott, near Sylvester	146.23	23.5	49	31	40.3	1.9	45	29	38.2	3.3	1.4	.....	32.5	12.0	37.0	....
	Engine No. 23, Moran and Boulevard	154.29	27.0	41	21	32.8	5.9	37	19	30.2	7.8	1.9	.....	28.0	13.0	30.5	3.0
	Engine No. 28, Riopelle and Milwaukee	155.56	27.5	37	14	29.8	8.4	35	17	28.2	9.3	0.9	.....	19.0	21.5	29.5	3.5
	Engine No. 13, Russell and Ferry	157.30	28.3	36	19	29.8	7.6	34	18	28.0	8.7	1.1	.....	19.0	20.7	30.5	1.7
	Engine No. 17, Cass and Amsterdam	152.83	26.3	36	18	28.2	11.2	35	15	28.3	10.4	.....	0.8	16.5	25.2	29.5	4.7
	Engine No. 21, Lincoln, near Piquette	154.88	27.2	32	15	26.5	12.0	33	13	26.7	11.1	.....	0.9	16.0	24.8	28.5	4.8
	Engine No. 24, Kenilworth, near John R	155.86	27.6	35	20	28.9	9.2	33	14	26.9	10.5	1.3	.....	16.5	23.9	28.5	4.4
	Engine No. 12, Sixteenth and Grand River	141.55	21.5	30	14	24.3	19.9	37	12	29.6	13.9		6.0	14.5	32.0	32.5	6.5
	Storage Yard, Orleans and Erskine	150.64	25.4	43	20	30.8	9.5	37	15	28.0	11.6	2.1	.....	20.5	22.1	27.0	8.1
	Engine No. 1, Hamtramck	....	....	35	14	25.6	....	31	7	20.3	....	.....	.....	9.5	....	27.0	....
	Average	....	....	.....	21.0	33.7	....	.....	20.2	28.4	....	.....	.....	....	....	....	....


1917
TOTAL
DAILY AVE.
DAYS
JANUARY
4,604,605,690
148,536,958
FEBRUARY
4,636,555,000
165,591,250
MARCH
4,496,1,64,320
145,037,559
APRIL
4,077,090,900
135,903,030
MAY
4,299,531,870
138,694,576
JUNE
4,314,841,970
143,828,066
MILLION GALLONS
195
190
185
180
175
170
165
160
155
150
145
140
135
130
125
120
115
55
50
45
40
TOTAL WATER CONSUMED
BASED ON PLUNGER DISPLACEMENT
AIR TEMPERATURE
WATER CONSUMED IN HIGH SERVICE
PRECIPITATION
DEGREES FAHR.
70°
60°
50°
40°
30°
20°
10°
0°
INCHES
0.5
0.0


1917
TOTAL
DAILY AVE
DAYS
JULY
5,171,633,660
166,826,892
AUGUST
5,086,232,500
164,072,016
SEPTEMBER
4,553,235,450
151,774,515
OCTOBER
4,359,793,930
140,638,514
NOVEMBER
3,949,921,370
131,664,046
DECEMBER
4,274,016,170
137,774,715
TOTAL WATER CONSUMED
BASED ON PLUNGER DISPLACEMENT
AIR TEMPERATURE
WATER CONSUMED IN HIGH SERVICE
PRECIPITATION
MILLION GALLONS
DEGREES FAHR.
INCHES
195
190
185
180
175
170
165
160
155
150
145
140
135
130
125
120
70
65
60
55
50
45
50°
40°
30°
20°
10°
0°
0.5
0.0

PIPE SYSTEM

The work on the construction of new extensions of water mains was materially hampered during the latter half of 1916 by shortage of labor, and throughout the Spring of 1917 by excessive rains. In an effort to overcome the difficulties due to lack of labor, the use of machinery was resorted to as far as possible. Four mechanical trench excavators were purchased, one steam and three gasoline operated, and also four gasoline operated back-fillers, and one portable air-compressor for caulking. The use of these machines throughout the current year resulted in the laying of a larger quantity of pipe with a considerably smaller force than would have been possible by the use of hand labor only, and despite the unfavorable weather conditions which prevailed for the first half of 1917, the total length of water mains laid was the greatest of any year in the history of the Water Board.

The total quantity of pipe actually laid during the year was 369,959 feet or 70.0 miles, of which 9.5 were main feeders, 12 inches in diameter or larger. These figures represent lines actually constructed, and are in excess of those given in the table of "Summary of Amount of Pipe Laid," as the latter shows only those extensions completed as a whole prior to June 30, 1917, and on which all costs had been entered in the records of completed jobs. This table gives the quantity of pipe laid as 271,416 feet or 51.4 miles, and 1.2 miles of small obsolete mains removed and replaced with larger ones, making a net gain of 50.2 miles, resulting in a total of 1055 miles of water mains of all sizes in the entire system.

Of the total mileage given, 153.2 miles is 12 inches in diameter and larger, and the 54.2 miles is 42 inches and 48 inches diameter.

Work has been in progress on the extension of the 36 inch main in Twelfth Street northwardly from Euclid Avenue to Ford Highway and thence westwardly on Ford Highway to Linwood Avenue where it will connect with the 42 inch main running south from the six mile road. Work is underway also on the 42 inch main from Holbrook and Dequindre northwardly on Dequindre to connect with the projected 48 inch main on the Six Mile Road.

The 24 inch main on Clairmount Avenue and Joy Road from Twelfth Street to Grand River Avenue, and the 16 inch main on Dexter Boulevard from Joy Road northwardly, are two of the important feeders to the northwesterly section of the City which are now in process of laying.

The total amount expended in the construction of water mains for the current year was $637,872.63, the unit costs of the several sizes being shown in the table below:

COST PER FOOT OF WATER MAINS

Size	No. of Feet	Material, etc.	Labor	Overhead Expense	Total
4″	379	.95	1.09	.13	2.17
6″	153,296	.71	.46	.05	1.22
8″	72,898	.98	.55	.06	1.59
10″	4,311	1.38	.69	.08	2.15
12″	15,762	1.79	.86	.10	2.75
16″	7,574	2.33	1.20	.14	3.67
24″	2,007	4.68	2.25	.26	7.19
36″	2,077	7.42	3.28	.38	11.08
42″	13,112	10.35	5.67	.65	16.67

The general increase in the unit cost of pipe laid as shown in the table is due to the higher cost of material; to shortage of labor resulting in gangs too small for good economic results; to higher wages paid, and to unfavorable weather conditions, all of these being contributory factors in raising the cost, which was offset in part only during a portion of the year by the utilization of trenching machines, and by the adoption of the method of laying longer extensions, regardless of whether any houses have been built or started on the line of proposed extensions.

The following series of tables give in full detail all information relating to the mains laid on completed jobs during the year, both in Detroit and surrounding territory supplied through the Detroit system, and also a summary of all water mains in the distribution system.

DISTRIBUTION SYSTEM

Total Amount of Pipe Laid and Discontinued in the Districts Named During the Year Ending June 30, 1917

	Detroit		Hamtramck	St. Clair Heights	Grosse Pt. Parks	Oakwood	Ecorse	Grosse Pt.		
	Feet Laid	Feet Disc.	Feet Laid	Feet Laid	Feet Laid	Feet Laid	Feet Laid	Feet Laid	Total Feet Laid	Total Feet Disc.
3″		560								560
4″	379	2,667							379	2,667
6″	114,604	2,167	15,292	8,455	9,910	775	4,260		153,296	2,167
8″	65,655	717		3,135			856	3,252	72,898	717
10″	4,311								4,311	
12″	15,762	303							15,762	303
16″	7,574								7,574	
24″	2,007								2,007	
36″	2,077								2,077	
42″	13,112								13,112	
	225,481	6,414	15,292	11,590	9,910	775	5,116	3,252	271,416	6,414

Amount in Miles	51.40
Discontinued in Miles	1.21
Net Gain	50.19

Total Pipe in System, June 30, 1917

Size	Detroit		Grosse Pointe Parks	St. Clair Heights	Ham-tramck	River Rouge	Ecorse	Oak-wood	Highland Park	Outside City		Entire System	
	Total	%	Total	Total	Total	Total	Total	Total	Total	Total	%	Total	%
2″	4,624	.094	....	....	....	....	....	....	....	....	....	4,624	.08
3″	48,783	.99	....	....	....	....	....	....	....	....	....	48,783	.87
4″	728,067	14.81	....	....	20,748	10,987	1,943	....	....	33,678	5.00	761,745	13.63
6″	2,165,373	44.04	29,173	47,903	168,535	47,374	34,179	18,978	111,376	457,518	67.91	2,622,891	46.92
8″	915,378	18.62	18,648	17,573	45,341	9,426	12,471	4,022	39,101	146,592	21.76	1,061,970	19.00
10″	245,773	5.00	....	49	3,476	....	....	....	4,298	7,823	1.16	253,596	4.54
12″	222,197	4.52	....	5,189	351	402	....	2,180	4,887	13,009	1.93	235,206	4.21
16″	110,168	2.24	....	....	....	4,298	....	220	9,982	14,500	2.15	124,668	2.23
18″	87	.00	....	....	....	....	....	....	....	....	....	87	.00
20″	393	.01	....	....	....	....	....	....	....	....	....	393	.01
24″	117,917	2.40	....	....	....	....	....	626	....	626	.09	118,543	2.12
30″	54,651	1.11	....	....	....	....	....	....	....	....	....	54,651	.98
36″	17,018	.35	....	....	....	....	....	....	....	....	....	17,018	.30
42″	144,397	2.94	....	....	....	....	....	....	....	....	....	144,397	2.58
45″	103	.00	....	....	....	....	....	....	....	....	....	103	.00
48″	141,884	2.89	....	....	....	....	....	....	....	....	....	141,884	2.54
Feet	4,916,813	....	47,821	70,714	238,451	72,487	48,593	26,036	169,644	673,746	....	5,590,559	....
Miles	931.21	....	9.06	13.39	45.16	13.73	9.20	4.93	32.13	127.60	....	1058.81	....

Total [illegible]

Summary of Amount of Pipe Laid in Detroit and Outside Villages, Year Ending June 30th, 1917

LOCATION	Feet	Size	Mat., Etc.	Labor	Overhead Expense	Total	Grand Total	Average Mat.	Average Labor	Average Ov'h'd.	Grand Average
City of Detroit	379	4″	$ 359.49	$ 414.75	$ 48.02	$ 822.26		$ 0.95	$1.09	$ 0.13	$ 2.17
	114,604	6″	80,719.75	52,891.72	6,123.84	139,735.31		.71	.46	.05	1.22
	65,655	8″	64,588.53	36,177.07	4,219.86	104,985.46		.98	.55	.06	1.59
	4,311	10″	5,940.21	2,980.58	356.47	9,277.26		1.38	.69	.08	2.15
	15,762	12″	28,248.19	13,507.17	1,564.14	43,319.50		1.79	.86	.10	2.75
	7,574	16″	17,683.30	9,095.73	1,046.91	27,825.94		2.33	1.20	.14	3.67
	2,007	24″	9,395.32	4,521.06	523.54	14,439.92		4.68	2.25	.26	7.19
	2,077	36″	15,419.01	6,812.56	788.89	23,020.46		7.42	3.28	.38	11.08
	13,112	42″	135,722.78	74,292.84	8,573.12	218,588.74	$582,014.85	10.35	5.67	.65	16.67
Village of Hamtramck	15,292	6″	11,874.10	6,544.34	757.83	19,176.27	19,176.27	.77	.43	.05	1.25
Village of St. Clair Heights	8,455	6″	5,556.43	1,951.21	225.94	7,733.58		.65	.23	.03	.91
	3,135	8″	2,820.66	975.36	112.93	3,908.95	11,642.53	.90	.31	.04	1.25
Village of Grosse Pointe Parks	9,910	6″	7,516.06	4,248.72	492.02	12,256.80	12,256.80	.75	.43	.05	1.23
Village of Oakwood	775	6″	691.40	279.72	32.39	1,003.51	1,003.51	.89	.36	.04	1.29
Village of Ecorse	3,540	6″	2,464.38	1,954.45	226.33	4,645.16		.70	.55	.06	1.31
	856	8″	540.37	525.83	60.89	1,127.09	5,772.25	.63	.61	.07	1.31
Township of Ecorse	720	6″	991.71	734.16	85.01	1,810.88	1,810.88	1.39	1.01	.12	2.52
Township of Grosse Pointe	3,252	8″	3,167.91	920.99	106.64	4,195.54	4,195.54	.97	.28	.04	1.29
	271,416		$393,699.60	$218,828.26	$25,344.77	$637.872.63	$637,872.63				

Pipe Laid Year Ending June 30, 1917

1916-17 Date	Location	Feet	Size	Material	Labor	Overhead Expense	Total Cost
Nov. 24	Abrey, E. Mt. Elliott East	248	6″	144.27	146.38	16.95	307.60
Mar. 30	Academy, Crawford East	1,160	8″	1,065.98	933.09	108.06	2,107.13
Oct. 25	Ainsworth, Marcus North	218	6″	194.71	96.16	11.14	302.01
Oct. 2	Albert, E. and W. of Tractor	501	6″	....	....	....	....
	Tractor, Fort to Albert	274	6″	691.40	279.72	32.39	1,003.51*
May 24	Anstell, S. Devine South	430	6″	296.86	141.20	16.34	454.40
Jan. 1	Apple Grove, Jefferson South	462	6″	333.24	172.66	20.00	525.90**
June 21	Ashland, 933′ N. Fox Creek North	120	6″	77.33	42.88	4.97	125.18
Mar. 21	Auburn, Jefferson North	861	6″	564.64	534.05	61.84	1,160.53**
Sept. 28	Auderdon, 305′ N. Waterloo North	343	8″	303.04	175.43	20.32	498.79
July 28	Balmoral, Woodward to Gloucester	532	6″	....	....	....	....
	Devonshire, Balmoral to Wellesley	517	6″	....	....	....	....
	Gloucester, Balmoral to Lincoln	467	6″	....	....	....	....
	Wellesley, Devonshire to Glouster	532	6″	2,994.44	1,988.03	230.22	5,212.69
Sept. 9	Barr, Livernois West	295	6″	237.04	158.46	18.35	413.85
July 18	Beard, 551′ N. Fort North	38	6″	32.60	13.85	1.60	48.05
Oct. 28	Beard, N. Bostwick to Goldsmith	175	6″				
	Goldsmith, Beard East	109	6″	268.64	128.58	14.89	412.11
Oct. 4	Begole, Ironwood to S. Tireman	722	8″	717.12	350.88	40.64	1,108.64
Nov. 25	Belleterre, Grand River to N. Welton	1,317	8″				
	Nardin, Chantler North	795	8″				
	Chantler, Belleterre to Nardin	1,119	6″	2,899.18	1,151.97	133.40	4,184.55
Nov. 3	Beniteau, 562′ N. Canfield North	258	6″	152.76	112.33	13.00	278.09
May 5	Bessemore, Harper to W. of Asher	3,703	8″	2,737.29	1,591.08	184.24	4,512.61
Oct. 5	Bethune, Dunedin East	368	6″	287.34	156.99	18.17	462.50
Sept. 29	Bezner, N. and S. of Kercheval	294	12″	564.38	375.80	43.52	983.70
Oct. 5	Blaine, Quincy East	431	6″	316.43	191.12	22.13	529.68
Feb. 23	Blaine, E. Radford East	330	6″	277.68	193.77	22.44	493.89
Dec. 1	Blaine, E. of 12th East	171	6″	109.91	27.33	3.16	140.40
Jan. 31	Blaine, Schmittdiel West	280	6″	273.37	236.18	27.36	536.91
June 16	Blanche, Grand River to Pleasant	770	6″				
	Pleasant, Blanche East	80	6″	618.46	407.64	47.21	1,073.31

1916-17 Date	Location	Feet	Size	Material	Labor	Overhead Expense	Total Cost
Oct. 3	Boulevard, Frederick to Kirby	378	6″	282.17	181.76	21.05	484.98
Feb. 8	Boulevard, N. Trombley North	89	6″	64.25	141.03	16.33	221.61
Dec. 15	Boulevard, 12th East	231	6″	189.06	157.24	18.21	364.51
Mar. 2	Budnick, Conant East	523	6″	351.17	494.20	57.23	902.60
Oct. 23	Bulwer, W. Parkinson West	38	6″	30.91	15.47	1.78	48.16
Nov. 14	Burns, 463′ S. Moffatt South	423	8″	388.09	279.18	32.33	699.60
Nov. 14	Burns, crossing Canfield	65	8″	87.93	54.71	6.33	148.97
Apr. 11	Cabot, N. Ferndale North	599	6″	426.00	205.11	23.75	654.86
July 11	Cahalan, W. Central West	253	8″	232.45	107.02	12.39	351.86
Aug. 14	Calvert, crossing LaSalle Blvd.	48	6″	....	....	....	....
	Glynn, crossing LaSalle Blvd.	48	8″	....	....	....	....
	Chicago, crossing LaSalle Blvd. (NS)	48	6″	....	....	....	....
	Chicago, crossing LaSalle Blvd. (SS)	48	8″	....	....	....	....
	Boston, crossing LaSalle Blvd. (NS)	48	6″	....	....	....	....
	Boston, crossing LaSalle Blvd. (SS)	48	8″	....	....	....	....
	Gladstone, crossing 14th	73	8″	....	....	....	....
	Hazelwood, crossing 14th	85	6″	....	....	....	....
	Edison, crossing 14th	48	8″	....	....	....	....
	Boston, crossing 14th (NS)	48	6″	....	....	....	....
	Boston, crossing 14th (SS)	48	8″	....	....	....	....
	Chicago, crossing 14th (NS)	48	6″	....	....	....	....
	Chicago, crossing 14th (SS)	48	8″	515.04	398.18	46.12	959.34
Jan. 19	Calvert, W. Hamilton West	236	6″	158.94	153.36	17.76	330.06
Sept. 13	Caniff, E. Ellery to E. Elmtree	1,123	6″	....	....	....	....
	Elmtree, Caniff to Talbot	1,321	6″	....	....	....	....
	Prescott, Elmtree East	941	6″	....	....	....	....
	Harold, Elmtree East	941	6″	....	....	....	....
	Casemere, Elmtree East	941	6″	....	....	....	....
	Talbot, Elmtree East	856	6″	4,658.03	2,230.52	258.29	7,146.84***
Oct. 13	Canton, 263′ N. Strong North	280	6″	174.90	138.06	15.98	328.94
Sept. 8	Cardoni, N. Westminster North	296	6″	177.83	116.35	13.47	307.65
Oct. 25	Carrie, N. Strong North	400	6″	244.48	191.09	22.12	457.69
Feb. 19	Carson, Dix South	1,280	6″	910.09	1,121.02	129.82	2,160.93
May 9	Carter, E. Quincy East	157	6″	150.54	84.54	9.80	244.88

1916-17 Date	Location	Feet	Size	Material	Labor	Overhead Expense	Total Cost
Jan. 9	Carter, Quincy East	428	6″	319.49	284.96	33.00	637.45
Mar. 16	Cascade, N. Kay North	2,099	8″	2,089.27	1,568.05	181.59	3,838.91
Oct. 2	Central, McGraw North	73	10″	86.98	45.98	5.33	138.29
May 28	Central, N. McGraw North	171	10″	228.47	122.69	14.21	365.37
July 20	Chalmers, N. and S. of Essex	221	8″	253.91	96.60	11.20	361.71
Dec. 13	Chalmers, N. and S. Waterloo	814	6″	525.72	149.98	17.36	693.06
July 18	Charest, Carpenter South	830	6″	....	....	....	....
	McDougall, Carpenter South	831	6″	....	....	....	....
	Mitchell, Carpenter to Casemere	1,628	6″	2,826.69	1,347.61	156.05	4,330.36***
Dec. 6	Charest, Connor South	353	6″	228.73	93.54	10.83	333.10***
Dec. 12	Charlevoix, Alter East	215	6″	206.56	95.35	11.04	312.95
Mar. 2	Charlotte, N. Jefferson North	362	6″	....	....	....	....
	Alexis, N. Jefferson North	315	6″	457.73	514.83	59.62	1,032.18**
Sept. 2	Chatfield, 120′ W. Beard West	228	6″	136.57	98.51	11.40	246.48
Oct. 12	Chene, Carpenter to Grant	2,437	6″	2,114.89	937.64	108.58	3,161.11
Feb. 2	Cherry Grove, Jefferson South	682	6″	522.97	561.45	65.02	1,149.44**
Jan. 9	Cicotte, Horatio North	212	6″	249.68	230.39	26.68	506.75
Mar. 22	Ciliax, Mt. Elliott West	1,160	6″	812.61	750.91	86.96	1,650.48
Mar. 6	Clarendon, Grand River West	930	6″	664.03	340.33	39.41	1,043.77
Mar. 3	Clarendon, E. Colfax East	880	6″	567.57	369.47	42.76	979.80
Aug. 9	Clairmount, 150′ W. Wilson West	507	6″	310.83	305.50	35.37	651.70
Jan. 31	Clairpointe, S. Freud South	212	8″	186.83	187.61	21.73	396.17
May 25	Clayton, W. Parkinson West	152	10″	204.09	163.35	18.92	386.36
Nov. 3	Commonwealth, crossing R. R	139	10″	(lowered)			
	Commonwealth, crossing R. R	500	10″	895.26	885.25	102.52	1,883.03
Jan. 10	Continental, 85′ S. Freud South	330	8″	299.82	153.43	17.77	471.02
Mar. 23	Continental, N. Essex North	1,112	8″	1,082.73	417.81	48.39	1,548.93
April 3	Concord, Marcus South	416	6″	319.96	397.62	46.04	763.62
Mar. 24	Connors, S. Freud South	820	6″	629.45	336.06	38.92	1,004.43
Sept. 29	Connor, Charlevoix North	134	8″	168.29	64.47	7.46	240.22
June 10	Copeland, Wabash R. R. North	261	8″	314.14	206.08	23.87	544.09
Oct. 6	Coplin, N. Waterloo North	702	6″	460.15	371.18	42.98	874.31
Mar. 22	Crawford, Glenmere North	668	6″	468.88	586.00	67.86	1,122.74
Aug. 31	Daniels, 139′ N. Horatio North	491	6″	285.46	216.34	25.05	526.85

1916-17 Date	Location	Feet	Size	Material	Labor	Overhead Expense	Total Cost
Sept. 18	Delmar, S. Caniff South	496	8″	484.02	220.63	25.55	730.20
Nov. 14	Devereaux, Livernois West	1,231	6″	855.40	457.39	52.97	1,365.76
July 8	Dexter, Euclid to Philadelphia	245	10″	....	....	....	....
	Dexter, Euclid South	80	10″	....	....	....	....
	Philadelphia, Dexter East	338	6″	....	....	....	....
	Euclid, E. and W. of Dexter	1,424	6″	1,565.09	906.90	105.01	2,577.00
Oct. 17	Dexter, Philadelphia to Pingree	270	10″	....	....	....	....
	Pingree, Dexter West	199	6″	637.25	299.65	34.70	971.60
Jan. 8	Dexter, Pingree to Carter	481	10″	694.88	227.03	26.29	948.20
July 17	Dodge, Mt. Elliott West	1,062	6″	687.35	456.30	52.83	1,196.48
Oct. 12	Domine, Mt. Elliott West	1,279	6″	915.82	416.24	48.20	1,380.26
July 21	Drake, 337′ S. Freud South	60	6″	39.62	26.40	3.06	69.08
Dec. 29	Drexel, City Limits North	2,901	8″	2,776.11	724.94	83.94	3,584.99*
Dec. 29	Drexel, N. Charlevoix to City Limits	340	8″	289.78	85.55	9.90	385.23
Oct. 31	Daniels, 175′ N. Essex South	168	8″	158.21	53.25	6.16	217.62
Mar. 30	Eastlawn, S. Freud, South	123	6″	75.85	50.14	5.80	131.79
June 17	Edmonton, Grand River South	590	6″	438.98	263.05	30.46	732.49
Sept. 28	Elizabeth and John R.	22	4″	118.29	66.09	7.65	192.03
Sept. 30	Elmer, Michigan North	475	8″	571.79	244.07	28.27	844.13
Dec. 20	Elmtree, Edwin South	182	6″	136.60	27.16	3.15	166.91***
April 3	Emerson, N. Essex South	638	6″	417.32	222.39	25.76	665.47
Sept. 29	Emerson, 903′ E. Central East	97	6″	64.22	30.96	3.59	98.77
Sept. 27	Epworth, 294′ N. Milford North	305	8″	258.25	139.40	16.14	413.79
Jan. 18	Epworth, N. Milford North	62	8″	56.44	34.26	3.97	94.67
Jan. 31	Erbie, Center Line East	983	6″	636.36	599.41	69.41	1,305.18
Dec. 23	Euclid. E. Dexter East	1,660	6″	1,101.83	432.78	50.11	1,584.72
Dec. 7	Euclid, E. and W. 14th	770	6″	....	....	....	....
	14th, Euclid to Nicolet	363	6″	876.17	349.81	40.51	1,266.49
Jan. 13	Eculid, E. and W. Holmur	301	6″	248.64	258.29	29.91	536.84
Oct. 24	Euclid, E. Radford East	279	6″	173.57	113.12	13.10	299.79
June 6	Euclid, 426′ E. Grand River East	480	6″	340.91	183.63	21.27	545.81
July 17	Euclid, W. Wilson West	122	6″	82.16	68.14	7.89	158.19
Oct. 18	Fairview, N. Mack North	438	6″	235.69	50.26	5.82	291.77***
Oct. 6	Falcon, E. and W. Elsmere	414	8″	410.30	147.31	17.05	574.66

1916-17 Date	Location	Feet	Size	Material	Labor	Overhead Expense	Total Cost
April 3	Falcon, Woodmere East	708	8″	665.70	197.82	22.71	886.23
July 31	Farr, Mt. Elliott to Budnick	717	6″	....	....	....	....
	Budnick, N. and S. Farr	268	6″	664.01	464.23	53.76	1,182.00
July 25	Farr, Mt. Elliott to Foster	1,140	6″	759.23	519.84	60.18	1,339.25
Mar. 15	Fernwood, Linsdale North	393	6″	255.83	258.05	29.88	543.76
Oct. 25	Field, Wagner to Roland	292	6″	....	....	....	....
	Roland, Field East	308	6″	501.01	174.80	20.24	696.05
May 15	Florida, N. Kirkwood, North	36	8″	49.74	28.30	3.28	81.32
Feb. 3	Gable, E. Center Line East	508	6″	328.90	186.84	21.64	537.38
Sept. 6	Garland, N. Warren to Shoemaker	1,903	6″	1,283.90	788.35	91.29	2,163.54***
Mar. 20	Gartner, Central, West	360	6″	268.47	145.22	16.82	430.51
Nov. 4	Gartner, E. Central to E. Green	38	8″	....	....	....	....
	Gartner, E. Central to E. Green	770	6″	559.56	198.36	22.98	780.90
July 11	Gartner, E. Evans, East	165	6″	101.07	51.58	5.98	158.63
Sept. 26	Girardin, Miller to N. DeBuel	661	6″	....	....	....	....
	DeBuel, Girardin to Foster	203	6″	....	....	....	....
	Heintz, Girardin to Foster	204	6″	843.13	304.91	35.30	1,183.34
Sept. 29	Girardin, Strong North	940	6″	617.25	282.99	32.78	933.02
April 3	Girardin, Marcus South	517	6″	360.98	330.68	38.29	729.95
July 29	Gladstone, W. Wilson to Schmittdeil	1,332	6″	....	....	....	....
	Schmittdiel, Gladstone South	172	6″	982.36	656.46	76.02	1,714.84
Jan. 31	Gladstone, W. Wilson West	75	6″	44.93	58.51	6.77	110.21
July 13	Gladwin, 702′ N. Mack North	1,598	6″	1,063.96	431.04	49.91	1,544.91***
Nov. 10	Gladwin, S. Charlevoix	22	8″	35.97	10.02	1.16	47.15
Nov. 17	Gladys, 307′ W. Livernois West	450	6″	308.01	138.96	16.08	463.05
Sept. 16	Glenmere, Crawford to E. Fremont	1,001	6″	....	....	....	....
	Danbury, Glenmere to N. Penrose	1,327	6″	....	....	....	....
	Exter, Glenmere to N. Penrose	1,334	6″	....	....	....	....
	Fremont, Glenmere to N. Penrose	1,332	6″	3,168.53	2,308.52	267.33	5,744.38
Jan. 22	Glynn, W. Hamilton West	99	8″	84.24	88.44	10.24	182.92
May 2	Glynn, W. Hamilton West	877	8″	776.78	563.12	65.20	1,405.10
Dec. 11	Grand, 12th West	272	6″	221.45	178.18	20.63	420.26
Oct. 27	Grand Marais, Jefferson South	1,832	6″	1,586.39	614.28	71.14	2,271.81***
June 9	Grand River, Plymouth to City Line	4,621	16″	....	....	....	....

1916-17 Date	Location	Feet	Size	Material	Labor	Overhead Expense	Total Cost
	Reaume, Grand River North	1,215	6″	10,664.05	6,595.51	763.76	18,023.32
Sept. 13	Gratiot Ct. Gratiot to Harper	572	6″	472.25	421.36	48.79	942.40
Mar. 3	Gray, N. and S. Waterloo	507	8″	496.26	389.12	45.06	930.44
Nov. 17	Green, Navy South	100	8″	154.25	56.43	6.53	217.21
Nov. 13	Hamilton, Shoemaker North	1,965	8″	1,717.17	440.98	51.06	2,209.21***
July 10	Hamilton, Shoemaker South	1,170	8″	1,103.49	534.38	61.87	1,699.74***
May 16	Hancock, Beaufait to Dennis	472	6″	....	....	....	....
	Dennis, Warren to Hancock	440	6″	....	....	....	....
	Meldrum, Hancock South	168	6″	792.41	536.72	62.15	1,391.28
Aug. 14	Hanson, Livernois West	1,217	6″	800.67	467.00	54.08	1,321.75
Nov. 8	Harbor, 223′ W. Ashland West	834	6″	507.71	231.43	26.79	765.93
Apr. 7	Harvard, N. Jefferson North	2,832	6″	2,580.17	1,561.99	180.88	4,323.04**
Dec. 9	Hazelwood, W. Wilson West	122	6″	73.27	60.16	6.97	140.40
July 31	Heidelberg, McDougall to Elmwood	739	6″	584.84	631.43	73.11	1,289.38
Apr. 3	Helen, Marcus South	599	6″	418.62	344.00	39.83	802.45
Oct. 31	Highland, Russell East	235	6″	222.55	106.49	12.34	341.38
May 19	Hillsboro, Grand River West	775	6″	553.35	322.77	37.38	913.50
Jan. 27	Hill, Warren to Livernois	831	6″	....	....	....	....
	Livernois, Hill North	100	10″	845.23	589.65	68.28	1,503.16
Sept. 23	Hindle, Caniff South	182	6″	203.92	136.11	15.76	355.79
Jan. 25	Holdin, crossing R. R.	631	8″	917.17	395.68	45.81	1,358.66
May 12	Holden, W. Greenwood to E. Brooklyn	631	8″	....	....	....	....
	12th, Blvd. to N. Euclid	2,077	36″	....	....	....	....
	Holdin, Blvd. to 3rd	4,206	42″	....	....	....	....
	3rd Antoinette to Palmer	784	42″	....	....	....	....
	Palmer, 3rd to W. of 2nd	552	42″	73,419.01	36,355.29	4,209.95	113,984.25
Sept. 4	Homer, 393′ W. Elsmere West	16	6″	28.37	9.91	1.15	39.43
Aug. 16	Hudson, Grand River West	52	6″	95.55	136.17	15.78	247.50
Sept. 15	Hurlbut, Harper North	300	6″	255.71	202.17	23.41	481.29
May 18	Indiandale, E. and W. Ellen	347	6″	234.91	168.28	19.49	422.68
Feb. 19	Inglis, N. Ferndale North	27	6″	15.19	41.86	4.84	61.89
Jan. 6	Iosco, Grand River North	244	6″	160.18	154.11	17.84	332.13
Mar. 16	Iosco, N. Grand River North	158	6″	109.03	74.07	8.58	191.68
Jan. 5	Iosco, S. Mackinaw South	63	6″	46.72	47.67	5.52	99.91

1916-17 Date	Location	Feet	Size	Material	Labor	Overhead Expense	Total Cost
Mar. 16	Iosco, W. Mackinaw West	195	6″	118.60	90.18	10.44	219.22
Oct. 5	Irene, Grand River to Yosemite	994	6″	....	....	....	....
	Albert, Grand River to Yosmite	774	6″	....	....	....	....
	Yosemite, Albert to N. Kay	2,989	6″	3,281.93	1,764.38	204.32	5,250.63
Sept. 20	Ironwood, 289′ N. Milford North	212	8″	197.19	109.70	12.92	319.81
Sept. 20	Ironwood, 159′ N. Milford North	130	8″	118.08	127.27	14.74	260.09
July 7	Iroquois, Goethe South	518	8″	487.26	174.95	20.26	682.47
June 5	Iroquois, Mack South	328	8″	355.07	161.74	18.73	535.54
Nov. 20	James Ct., Holcomb East	228	6″	191.15	162.98	18.88	373.01
Nov. 24	Jameson, Pennsylvania West	138	6″	109.76	122.61	14.20	246.57
May 22	Jefferson, McClellan to Belvidere	277	6″	255.23	289.98	33.58	578.79
Aug. 28	Joy, Vinewood West	682	24″	....	....	....	....
	Petoskey, crossing Joy	45	8″	....	....	....	....
	Lovette, Joy North	2,584	8″	....	....	....	....
	Scotten, Joy North	2,604	8″	....	....	....	....
	Vinewood, Joy North	2,660	6″	9,056.01	4,955.32	573.83	14,585.16
Oct. 7	Kercheval, Drexel to W. Rusch	760	16″	....	....	....	....
	Kercheval, Rusch to W. Oneida	425	16″	....	....	....	....
	Kercheval, Oneida to Alter	1,768	16″	7,783.30	2,995.73	346.91	11,125.94
Nov. 24	Kerwin, Harper South	59	6″	....	....	....	....
	Harper, Kerwin West	64	8″	149.78	94.16	10.90	254.84
Nov. 24	Kerwin, S. Harper South	174	6″	112.75	47.12	5.45	165.32***
Feb. 26	Klein, Conant East	270	6″	271.96	312.02	36.14	620.12
Nov. 18	Kosciuzsko, E. Mt. Elliott East	61	6″	35.30	27.58	3.18	66.06
July 2	Ladue, Baldwin East	289	6″	226.33	127.72	14.79	368.84
July 21	Lakewood, 60′ S. Essex South	100	8″	100.12	33.86	3.92	137.90
Feb. 15	Lakewood, S. Essex South	1,802	8″	1,767.96	1,129.60	130.81	3,028.37
Oct. 10	Lakewood, Kercheval North	469	6″	290.83	165.49	19.16	475.48
Mar. 13	Lakeview, S. Waterloo North	938	8″	905.31	865.48	100.22	1,871.01
June 19	Lane, 363′ W. Lawndale West	91	8″	89.41	44.34	5.14	138.89
Sept. 5	Lane, 472′ W. Lawndale West	99	8″	80.47	38.00	4.40	122.87
Oct. 28	Lane, 374′ E. Central East	64	6″	45.42	25.01	2.90	73.33
Nov. 17	Lane, E. Central East	60	6″	74.14	34.28	3.97	112.39
Mar. 17	Lane, Central West	420	6″	313.23	172.53	19.98	505.74

1916-17 Date	Location	Feet	Size	Material	Labor	Overhead Expense	Total Cost
July 25	LaSalle, Gardens North, 750′ E. of 14th East	72	6″	44.00	30.58	3.54	78.12
July 31	LaSalle Gardens, S., Dunedin West	195	8″	175.97	93.16	10.79	279.92
Sept. 6	Laurain, Ferndale North	611	6″	465.51	179.67	20.80	665.98
Nov. 18	Lawrence, 709′ W., Hamilton West	284	8″	213.51	120.03	13.89	347.43
Sept. 23	Lee, 12th East	201	[illegible]″	....	....	....	....
	12th, Lee to Camden	218	8″	....	....	....	....
	Camden, 12th East	571	6″	747.36	498.24	57.70	1,303.30
Dec. 21	Lehman, Conant West	1,177	6″	837.97	502.61	58.20	1,398.68 ***
July 5	Leigh, Dearborn to Peterson	192	6″	....	....	....	....
		2,321	12″	4,552.18	1,741.86	201.70	6,495.74
Feb. 26	Lenox, Kercheval South	730	8″	695.25	422.48	48.92	1,166.65
Feb. 26	Lenox, N., Jefferson North	175	8″	184.99	143.64	16.64	345.27
Oct. 30	Lenox, N., Jefferson North	121	8″	115.86	70.75	8.25	194.86
Oct. 18	Lemay, Shoemaker South	2,183	6″	1,463.90	146.54	16.97	1,627.41***
May 27	Lincoln, crossing R. R	602	8″	835.09	1,865.08	215.98	2,916.15
Dec. 4	Linslade, W. Ironwood West	768	6″	479.63	365.74	42.35	887.72
June 24	Linslade, W. Grand River West	1,200	6″	768.69	494.76	57.29	1,320.74
Nov. 22	Linslade, Colfax, East	317	6″	229.41	138.68	16.06	384.15
Sept. 2	Lipton, Reaume, East	297	6″	244.17	113.84	13.18	371.19
July 19	Linwood, crossing Montgomery	62	8″	115.22	44.23	5.12	164.57
Aug. 9	Linwood, crossing Vicksburg	62	8″	81.77	56.30	6.58	145.15
Nov. 13	Linwood, Montgomery to Vicksburg	229	8″	252.49	144.23	16.70	413.42
July 18	Lodge, S. of Jefferson, South	133	8″	121.91	75.92	8.79	206.62
Nov. 8	Longworth, Elsmere West	209	8″	173.63	78.71	9.11	261.45
April 3	Longworth, Woodmere East	732	8″	696.40	383.34	44.39	1,124.13
June 20	Lycaste, 870′ S. Mack South	552	6″	336.50	246.31	28.52	611.33
June 20	Lycaste, N. and S. Goethe	162	6″	137.65	107.53	12.45	257.63
Dec. 9	McDougall, Caniff North	786	6″	626.80	176.77	20.46	824.03
Oct. 17	Mackie, 282′ W., Yale West	317	6″	209.26	122.00	14.13	345.39
Aug. 14	Mackinaw, 55′ N., Cottrell North	149	6″	99.06	59.28	6.86	165.20
June 19	Manistique, N., Essex South	12	8″	25.03	11.65	1.35	38.03
Nov. 2	Manistique, 308″ N., Essex South	277	8″	250.13	79.64	9.22	338.99
Sept. 2	Manistique, N. and S. Kercheval	2,106	8″	2,098.37	653.37	75.66	2,827.40

1916-17 Date	Location	Feet	Size	Material	Labor	Overhead Expense	Total Cost
Mar. 15	Manistique, N. and S. Essex	947	8″	895.27	311.33	36.06	1,242.66
July 21	Maplewood, W. Ironwood	391	6″	....	....	....	....
	Colfax, Maplewood to Clarendon	575	8″	....	....	....	....
	Clarendon, Colfax East	158	6″	957.16	549.14	63.60	1,569.90
Oct. 19	Marcus, Center Line East	966	8″	932.84	240.48	27.84	1,201.16
Aug. 23	Martin, 25′ N., Horatio North	564	10″	676.43	270.05	31.27	977.75
Oct. 30	Martin, Burwell to Wagner	1,606	10″	....	....	....	....
	Burwell, Martin to Braden	379	6″	....	....	....	....
	Braden, Burwell South	230	6″	2,497.72	964.41	111.68	3,573.81
Aug. 14	Martindale, N., Grand River North	30	6″	21.91	11.83	1.38	35.12
Feb. 3	Martindale, N., Joy North	297	8″	259.75	507.34	58.75	825.84
Nov. 8	Martindale, N., Grand River North	450	6″	....	....	....	....
	Alviston, Joy North	464	8″	736.53	324.54	37.58	1,098.65
Feb. 15	Marlborough, S., Essex South	37	8″	30.96	32.75	3.79	67.50
Aug. 31	Marlborough, N. and S., Kercheval	259	6″	238.50	186.57	21.60	446.67
Dec. 7	Marlborough, N., Kercheval North	2,019	6″	1,321.18	529.56	61.32	1,912.06
Nov. 24	Marietta, Pennsylvania West	133	4″	89.97	104.42	12.09	206.48
Nov. 27	Maxwell, Norvell to Canfield	203	6″	152.20	82.67	9.57	244.44
July 16	Mathews, Helen West	162	4″	106.01	116.76	13.52	236.29
Feb. 19	Maxwell, Harper North	538	6″	395.49	595.67	68.97	1,060.13
July 26	Meldrum, Mack to Charlevoix	1,702	12″	3,111.14	1,557.41	180.35	4,848.90
Oct. 23	Mercier, Martin East	282	6″	231.34	154.30	17.87	403.51
July 13	Michigan Stamping Co., N. Mack	351	8″	391.80	196.05	22.70	610.55*
Mar. 16	Milford, W., Epworth West	79	6″	44.75	126.08	14.60	185.43
Aug. 24	Milwaukee, Oakland to Beaubien	809	12″	1,510.06	1,357.48	157.20	3,024.74
Sept. 20	Monica, Grand River North	744	8″	730.95	464.39	53.78	1,249.12
Feb. 1	Monica, N., Grand River North	121	6″	113.77	130.12	15.07	258.96
Oct. 13	Moran, Carpenter North	1,071	6″	1,177.09	360.40	41.74	1,579.23
Mar. 30	Mill, Webster West	720	6″	991.71	734.16	85.01	1,810.88**
Aug. 10	Nagle, W., Center Line West	605	6″	399.61	285.70	33.08	718.39
Nov. 19	Nardin, N., Grand River to Thomas	422	8″	....	....	....	....
	Thomas, Nardin West	346	6″	671.13	273.02	31.61	975.76
June 10	Navahoe, 767′ S., Jefferson South	146	8″	130.80	87.20	10.10	228.10
Feb. 22	Navahoe, S., Jefferson South	517	8″	485.95	411.23	47.62	944.80

1916-17 Date	Location	Feet	Size	Material	Labor	Overhead Expense	Total Cost
Mar. 20	Navy, E., Green East	123	8″	97.38	82.20	9.52	189.10
Jan. 2	Oakdale, Mandale North	583	6″	409.68	281.39	32.58	723.65
Mar. 9	Oakdale, N., Ferndale North	882	6″	....	....	....	....
	Woodbine, Oakdale to Augustine	270	6″	....	....	....	....
	Augustine, Woodbine North	610	6″	1,294.84	956.23	110.73	2,361.80
Sept. 9	Orchard Park, Grand River North	680	6″	492.69	414.50	48.00	955.19
Dec. 28	Oregon, E. and W., Thornton	645	8″	625.89	344.95	39.95	1,010.79
July 24	Oregon, W., Ironwood West	312	8″	277.34	191.53	22.18	491.05
July 24	Pacific, E. and W., Ironwood	584	8″	579.72	332.47	38.50	950.69
Jan. 4	Pacific, W., Thornton West	146	8″	131.40	148.56	17.20	297.16
June 22	Palmer, W., Brush to Woodward	1,125	8″	....	....	....	....
	Canfield, Antoine East	203	42″	....	....	....	....
	Antoine, Canfield to Palmer	4,167	42″	....	....	....	....
	Palmer, Antoine to W. of Second	3,200	42″	78,852.78	45,515.11	5,240.65	129,608.54
Oct. 13	Parkview, Jefferson South	605	6″	392.54	362.91	42.02	797.47
Dec. 9	Pasadena, 12th West	28	8″	....	....	....	....
Dec. 9	Pasadena, 12th West	272	6″	263.84	187.75	21.74	473.33
Mar. 6	Peter Smith, Mt. Elliott West	1,330	6″	899.85	587.91	68.08	1,555.84
June 14	Philadelphia, Quincy East	965	6″	683.95	448.36	51.92	1,184.23
June 27	Philadelphia, Schmittdiel East	502	6″	365.94	452.27	52.37	870.58
Sept. 22	Philadelphia, 397′ W., Wilson West	122	6″	74.68	54.48	6.31	135.47
Mar. 13	Philadelphia, E., Radford East	531	6″	372.25	596.42	69.07	1,037.74
Oct. 12	Philadelphia, Dexter West	620	6″	418.91	265.53	30.74	715.18
Oct. 17	Philadelphia, 310′ E., Dexter East	134	6″	141.29	66.81	7.73	215.83
Dec. 5	Philadelphia W., Wilson West	62	6″	38.23	29.34	3.40	70.97
June 20	Philip, N. and S., Essex	1,889	6″	1,767.33	518.40	60.03	2,345.76
Sept. 19	Pingree, E. and W., 12th	439	6″	....	....	....	....
	12th and Pingree	284	8″	977.08	546.42	97.69	1,621.19
Oct. 24	Pingree, Quincy to Radford	355	6″	211.07	215.73	24.99	451.79
Dec. 28	Pingree, E. and W., Holmur	753	6″	431.87	354.45	41.05	827.37
Nov. 25	Pingree, Dexter East	415	6″	328.82	145.25	16.82	490.89
Mar. 30	Piper, N. and S., Essex	840	8″	802.76	458.70	53.11	1,314.57
April 3	Plymouth, Monica to Prospect	1,432	12″	....	....	....	....
	Prospect, Plymouth South	177	8″	....	....	....	....

1916-17 Date	Location	Feet	Size	Material	Labor	Overhead Expense	Total Cost
	Semmes, Plymouth South	548	8″	....	....	....	....
	Bryden, Plymouth to S. Thornton	1,076	6″	....	....	....	....
	Shipman, Plymouth to S. Thornton	1,550	8″	5,592.09	2,446.05	283.26	8,321.40
Oct. 12	Post, South St. North	441	6″	340.69	146.87	17.01	504.57
May 18	Proctor, N., Michigan North	741	8″	681.67	367.44	42.55	1,091.66
Aug. 21	Pulling, Joy North	1,299	8″	1,286.82	754.71	87.39	2,128.92
Oct. 23	Quincy, S., Carter to Hazelwood	686	8″	....	....	....	....
	Hazelwood, Quincy East	330	6″	970.56	424.30	49.14	1,444.00
June 20	Rademacher, Army North	92	8″	121.42	65.77	7.62	194.81
Sept. 21	Rathbone, Woodmere to Elsmere	942	6″	658.57	254.60	29.48	942.65
Sept. 19	Reddig, 666′ S., Freud South	726	6″	494.41	213.81	24.76	732.98
Nov. 14	Regular, Artillery East	216	6″	180.59	132.53	15.35	328.47
Sept. 30	Richardson, Mt. Elliott East	382	6″	302.09	137.75	15.96	455.80
Mar. 19	Rockwood, Jefferson North	856	8″	540.37	525.83	60.89	1,127.09††
Oct. 6	Rolfs Pl., 771′ N., Mack North	177	6″	130.17	71.95	8.33	210.45
Mar. 15	Seebaldt, W., Ironwood West	144	8″	129.98	133.55	15.47	279.00
Dec. 2	Seminole, Charlevoix North	511	8″	455.48	228.30	26.44	710.22
Aug. 28	Seneca, N. and S. Canfield	99	8″	100.62	54.76	6.34	161.72
Feb. 10	Seminole, N., Harper North	62	6″	38.34	62.61	7.25	108.20
Dec. 5	Seward, E., 14th East	145	8″	141.40	51.09	5.91	198.40
Feb. 13	Seward, W., Wilson West	52	6″	29.99	63.09	7.30	100.38
July 24	Seward, 440′ E. of 14th East	266	8″	244.92	124.45	14.41	383.78
Dec. 8	Seward, Wilson West	100	6″	65.16	59.91	7.01	132.08
Sept. 22	Sheridan, Harper to N. Duncan	367	24″	....	....	....	....
	Harper, Sheridan to Baldwin	632	24″	....	....	....	....
	Baldwin, crossing Harper	56	24″	5,775.13	3,058.96	354.23	9,188.32
Dec. 30	Sherwood, Huber to Marcus	1,264	6″	....	....	....	....
	Huber, W., Sherwood to E. Winfield	1,260	8″	2,042.48	636.10	73.66	2,752.24
Feb. 15	Springwells, N., Michigan North	243	8″	230.88	308.45	35.71	575.04
Feb. 16	Sherwood, Huber to City Line	170	6″	138.63	76.84	8.90	224.37
Feb. 16	Sherwood, City Line to Greenwood	1,022	6″	....	....	....	....
	Greenwood, Sherwood to A. W. VanDyke	2,360	6″	2,559.38	2,166.13	250.84	4,976.35†††
Nov. 16	Sheridan, Chene to Dubois	305	6″	228.85	66.33	7.69	302.87
Nov. 3	Sloman, Russell East	174	6″	169.59	77.08	8.93	255.60

1916-17 Date	Location	Feet	Size	Material	Labor	Overhead Expense	Total Cost
Oct. 28	Spokane, E. and W., Thornton	735	8″	719.25	304.30	35.25	1,058.80
Feb. 16	Springwells, S., Malta South	111	8″	110.95	93.82	10.87	215.64
Nov. 4	St. Clair, 278′ N., Warren North	1,901	6″	1,243.47	375.57	43.50	1,662.54***
Dec. 15	Starr, Dix South	425	8″	384.93	135.85	15.73	536.51
Sept. 13	Sterritt, 691′ E., Gratiot East	158	8″	160.85	41.08	4.76	206.69
Feb. 20	Stoepel, Grand River North	593	6″	511.80	650.21	75.29	1,237.30
Nov. 10	Sturtevant, 12th West	44	8″	....	....	....	....
		202	6″	178.92	94.23	10.91	284.06
May 7	Tarnow, N. and S. Wagner	240	8″	271.64	153.43	17.77	442.84
Mar. 23	Tennessee, S., Freud South	61	8″	55.07	26.63	3.08	84.78
June 3	Tennyson, 990′ S., Freud South	739	8″	676.55	290.22	33.61	1,000.38
July 11	Thornton, Tireman South	361	6″	243.47	185.83	21.52	450.82
June 2	Thornton Pl., 80′ E., Ironwood West	773	8″	701.87	350.07	40.54	1,092.48
July 13	Thornton, 192′ N., Milford North	157	6″	97.46	75.55	8.75	181.76
Sept. 26	Thornton, 366′ S., Tireman South	405	6″	279.70	144.00	16.67	440.37
Aug. 7	Theodore, W., St. Aubin West	62	4″	45.22	127.48	14.76	187.46
Oct. 18	Traverse, Van Dyke East	438	8″	....	....	....	....
	Holcomb, Woodlawn North	578	8″	....	....	....	....
	Van Dyke, Woodlawn to Traverse	270	24″	....	....	....	....
	Woodlawn, Gratiot to Van Dyke	5,931	12″	11,829.70	4,329.36	501.35	16,660.41
Mar. 14	Traverse, E., Van Dyke East	997	8″	926.46	692.73	80.21	1,699.40
May 27	Trumbull, crossing R. R.	1,008	12″	1,742.56	1,703.79	197.30	3,643.65
Feb. 21	Turner, Lawn to Woolworth	28	6″	....	....	....	....
		257	12″	574.65	1,025.77	118.78	1,719.20
Nov. 2	Tuxedo, 12th West	258	6″	211.25	100.53	11.64	323.42
June 29	Van Court, Tireman South	278	8″	311.15	179.44	20.78	511.37
Dec. 19	Vancouver, E. and W. Thornton	243	8″	304.83	132.89	15.38	453.10
Feb. 8	Van Dyke, N., Hardyke North	183	6″	120.13	227.08	26.30	373.51
Nov. 15	Vernor, 136′ W., Gilbert West	63	6″	37.96	30.11	3.49	71.56
July 7	Virginia, 257′ W. of 12th St. West	180	6″	114.82	96.58	11.17	222.57
Feb. 23	Virginia, 14th East	581	6″	423.16	646.95	74.92	1,145.03
Mar. 23	Wagner, Mt. Elliott West	1,304	8″	1,449.74	1,087.07	125.88	2,662.69
Nov. 18	Walnut, Plymouth South	1,871	6″	1,292.52	738.08	85.46	2,116.06
Jan. 25	Walton, Warren East	1,181	6″	769.67	682.94	79.08	1,531.69

1916-17 Date	Location	Feet	Size	Material	Labor	Overhead Expense	Total Cost
Nov. 20	Warner, Grand River to Green	1,909	8″	....	....	....	....
	Lawn, E. and W. Warner	918	6″	....	....	....	....
	Woolworth, E., Warner to E. Bryden	637	6″	....	....	....	....
	Woodbine, Shipman to Turner	563	6″	3,618.04	1,578.69	182.81	5,379.54
Sept. 28	Warren, W. of P. M. R. R. West	69	10″	....	....	....	....
		2,008	12″	3,895.68	1,088.78	126.08	5.110.54
Sept. 2	Welton, Reaume East	242	6″	213.62	121.15	14.03	348.80
Dec. 8	Westfield, Jefferson North	858	6″	585.80	171.46	19.85	777.11††
Nov. 9	Whittaker, 366′ E., Green East	64	8″	55.26	34.44	3.99	93.69
Mar. 15	Whittaker, E., Central East	228	8″	213.44	106.31	12.31	332.06
July 11	Whittaker, Green East	382	8″	382.39	115.92	13.42	511.73
June 5	Whitman, 303′ S., Freud South	156	6″	96.58	58.14	6.74	161.46
Aug. 25	Whitewood, N., Cobb to N. Milford	365	6″	272.20	151.71	17.56	441.47
Mar. 15	Whitewood, N., Milford North	353	6″	251.24	275.16	31.86	558.26
Aug. 21	Whitewood, S., Tireman South	275	6″	195.23	92.60	10.72	298.55
Dec. 2	Whitewood, N., Milford North	62	6″	38.15	11.66	1.35	51.16
Sept. 6	Willette, Livernois West	544	8″	554.70	196.88	22.80	774.38
Dec. 21	Willette, W., Livernois West	.....	.....	186.68	....	....	186.68
Feb. 9	Willette, W., Livernois West	122	8″	118.57	116.72	13.51	248.80
Dec. 4	Winkelman, Conant East	394	6″	....	....	....	....
	Conant, crossing Winkelman	60	8″	353.99	299.71	34.71	688.41
April 12	Woodmere, Oakdale to Cabot	303	6″	280.04	73.00	8.45	361.49
Feb. 20	Woolworth, Blanche West	129	6″	165.08	144.01	16.67	325.76
Nov. 15	Wyoming, Mt. Elliott to Foster	1,411	6″	1,026.00	465.97	53.96	1,545.93
Oct. 10	Yellowstone, Joy North	2,790	8″	2,544.19	1,004.40	116.31	3,664.90
May 20	Yorkshire, Jefferson to Mack	5,246	6″	3,349.50	2,072.45	240.00	5,661.95**
Feb. 27	Yosemite, Joy to Albert	453	6″	318.80	692.25	80.17	1,091.22

†Village of Oakwood.
††Village of Ecorse.
†††Village of Hamtramck.
*Township of Grosse Pointe.
**Village of Grosse Pointe Parks.
***Village of St. Clair Heights.

STORAGE YARD

The work done at the Storage Yard, which includes all repairs to water mains, tapping of mains for service connections, testing, repairing and setting of meters, and the handling of all material, supplies and equipment, is set forth in detail in the accompanying tables.

Division of Storage Yard Labor Year Ending June 30th, 1917

Loading, unloading, storing and checking materials	$15,100.15
Cleaning, triming and plugging salvaged pipe and special castings	31.26
Watching and care of yards, buildings and equipment	6,720.08
Caring for stables, wagons and harness	3,221.55
Night, Sunday and holiday emergency crews	10,551.40
Repairing and maintaining motor vehicles and other gasoline driven equipment	3,781.19
Repairing wagons and harness	79.75
Horseshoeing	307.08
Repairing and maintaining tools and equipment	10,830.80
Superintendence and clerical work	15,879.89
Special jobs	344.52
Total	$66,847.67

General Work, Year Ending June 30th, 1917

	Material	Labor	Total
Tapping mains and making 6,732 ⅝", 2,757 ¾", 1,964 1", 117 1½", 141 2", 87 3", 38 4", 24 6", 2 8" and 1 10" service connections and discontinuing 141 ⅝", 9 ¾" and 30 1"	$16,976.93	$ 8,582.06	$25,558.99
Public drinking fountains set (4)	157.30	101.01	258.31
Examining, repairing and maintaining gates and wells	2,489.62	2,864.27	5,353.89
Repairing leaks and breaks in mains (198)	1,590.73	4,048.70	5,639.43
Attending to leaks on service connections (832)	844.54	3,136.67	3,981.21
Responding to false reports of leaks (128)	144.94	278.47	423.41
Opening blow-off to flush dead ends	250.84	2,172.27	2,423.11
Shutting service connections on account of leaks and non-payment and letting on same	120.84	298.12	418.96
Examining fire plants, air chambers, hydraulic elevators, river connections, setting pressure gauges and reading pressures	243.84	798.76	1,042.60
Curing no water and short supply complaints	224.81	989.66	1,214.47
Repairing sunken trenches and damaged walks and lawns	78.00	353.46	431.46
Caring for drinking fountains	186.85	1,074.06	1,260.91
Setting hydrants—Billed Village of Ecorse	204.37	45.17	249.54
Laying 4" and 6" pipe in Riverside Park—Billed Recreation Commission	528.76	44.51	573.27
Martin S. of Pittsburgh. Moving 2 blow-offs	52.05	38.94	90.99
Setting hydrant—Billed Township of Greenfield	123.57	44.03	167.60
Setting 6" meter—Billed Village of Hamtramck	357.06	37.24	394.30
Maintenance of Main Office building and equipment	65.22	385.12	450.34
Maintenance of buildings, fences and equipment	99.51	....	99.51
Operation and maintenance of yards and buildings	22.59	....	22.59
Yard cartage and expressing to stores	1,337.00	2,040.31	3,377.31
Yard supplies and expense	21.73	....	21.73
Repair and maintain tools and equipment	195.95	....	195.95
	$26,317.05	$27,332.83	$53,649.88

SERVICES AND METERS

During the year 11863 new services were installed, and 180 old services were removed, making a net gain of 11,683, which makes a total of 143,713 service connections of all sizes in the system.

Size		Installed	Removed	Net Increase	Total in System
⅝"	Service Cocks..........	6732	141	6591	98652
¾"	Service Cocks..........	2757	9	2748	4825
1"	Service Cocks..........	1964	30	1934	37016
1½"	Service Cocks..........	117		117	130
2"	Service Cocks..........	31		31	44
2"	Sleeve and Valve.......	110		110	1475
3"	Sleeve and Valve.......	87		87	852
4"	Sleeve and Valve.......	38		38	468
6"	Sleeve and Valve.......	24		24	227
8"	Sleeve and Valve.......	2		2	20
10"	Sleeve and Valve.......	1		1	3
12"	Sleeve and Valve.......				1
	Totals.............	11,863	180	11,683	143,713

All new services were metered and 6868 old services were equipped with meters, the total net gain in metered services being 18551, making a total of 65542 meters in services at the end of the fiscal year.

The following tables give the number of meters set, the cost of installing, cost of testing and the types and sizes of meters in service.

Number of Meters Set, Year Ending June 30, 1917

	⅝"	¾"	1"	1½"	2"	3"	4"	6"	8"	10"	16"	Ind.	Total
In Service July 1 1916..........	28230	13012	3566	796	752	292	208	100	5	1	1	28	46991
Set during year ending June 30, 1917..	16316	5589	1360	114	103	49	29	10	2	..	..	..	23572
Total..............	44546	18601	4926	910	855	341	237	110	7	1	1	28	70563
Removed during year ending June 30, 1917.........	2999	1446	534	15	19	3	1	2	..	..	..	2	5021
Net Gain..........	13317	4143	826	99	84	46	28	8	2	..	..	2	18551
Total in service July 1, 1917..........	41547	17155	4392	895	836	338	236	108	7	1	1	26	65542

Cost of Installing Meters, Year Ending June 30th, 1917

Size	Number	Labor and Cartage	Material	Total	Ave. Labor and Cartage	Ave. Material	Average Cost.
⅝"	13,317	$4,660.95	$55,931.40	$60,592.35	$0.35	$4.20	$4.55
¾"	4,143	1,450.05	26,929.50	28,379.55	0.35	6.50	6.85
1"	826	289.10	7,533.16	7,822.26	0.35	9.12	9.47
1½"	99	105.93	2,196.40	2,302.33	1.07	22.18	23.25
2"	84	89.88	2,730.00	2,819.88	1.07	32.50	33.57
*3"	46						
*4"	28						
*6"	8						
**8"	2						
		$6,595.91	$95,320.46	$101,916.37			

*Set by consumer.
**Set and supplied by consumer.

Cost of Meter Testing, Year Ending June 30th, 1917

Sizes	Number	Flows	Cost	Average
5/8"	13,172	Full to 1/16"	$1,251.37	.09½
3/4"	4,143	Full to 1/16"	393.61	.09½
1"	882	Full to 1/8"	83.78	.09½
1½"	83	Full to 1/8"	65.59	.79
2"	75	Full to 1/8"	59.28	.79
3"	46	Full to 1/8"	145.38	3.16
4"	28	Full to 1/8"	88.50	3.16
6"	8	Full to 1/8"	25.31	3.16
8"	2	Full to 1/8"	6.32	3.16
	18,439		$2,119.14	

Kind of Meters in Service, Year Ending June 30th, 1917

	5/8"	3/4"	1"	1½"	2"	3"	4"	6"	8"	10"	16"	Ind.	Total
Buffalo American	33	10	7	6	2								58
Desper Indicator												26	26
Gamon Watch Dog*	1,895	206	83	109	157								2,450
Gamon Watch Dog **	20,612	5,867											26,479
Gamon Watch Dog Current								2					2
Hersey D	10	3		12	14	5	7	1					52
Hersey Detector						1	8	19	6	1			35
Hersey F	11	5	1										17
Hersey Rotary			5	2	1								8
Hersey Torrent						5	3	3					11
National Crown			3										3
National Nash	8,359	6,232	965	141	67	27	14						15,805
Neptune			1										1
Neptune Crest Trident											1		1
Neptune Empire Compound							1						1
Pittsburg Eureka							1	1					2
Pittsburg Keystone	28	8	5	3	2		2						48
Thomson	4,460	1,563	2,303	492	458	221	125	41					9,663
Union King	29	9	2	2	3								45
Union Nilo					1		1						2
Worthington	6,110	3,252	1,017	128	130	78	74	41					10,830
Worthington Piston					1	1							2
Worthington Turbine									1				1
	41,547	17,155	4,392	895	836	338	236	108	7	1	1	26	65,542

*235 Revolutions.
**300 Revolutions.

PUMPING STATION AND GROUNDS

The general work of improvement to the grounds around the pumping station was carried on throughout the year, and some progress made in filling in some of the canals at the westerly end of the grounds. On account of war conditions it was deemed advisable to guard the stations and the grounds have been fenced in and visitors excluded from the immediate vicinity of the station.

The work on the eight feet diameter tunnel to connect the new station, was completed to within about twenty feet of the connecting end when work was suspended, owing to the inability to obtain the 72 inch gates for the connection to the water gallery; as soon as these gates are received and set, the remaining portion of the tunnel will be completed.

Contracts were let on December 26, 1916 to the Worthington Pump and Machinery Co. (Snow-Holly Works) for two 37,000,000 gallon vertical triple expansion pumping engines at a cost of $418,250.00 for the two engines. These pumps will have a maximum capacity of 40,000,000 gallons each, and will be set in the new pumping station. The foundations for these pumping engines have been completed and the work on the construction of the engines is progressing satisfactorily at the Snow-Holly Works at Buffalo.

An ice fender around the intake crib, as recommended in last year's report was constructed during the past season, and apparently it accomplished the desired results, as no inconvenience was experienced last winter from ice clogging the ports.

NEW AND PROPOSED WORK

The work on the proposed extension of 48 inch mains from the pumping station to the northwesterly section of the city, as recommended in the last annual Report, has progressed to the extent of contracting for all of the necessary pipe, part of which has been received and distributed, but actual work of construction has been confined to the extension of the 36 inch main on Twelfth Street and Ford Highway, and to a portion of the 42 inch line in Dequindre Street.

The recommendations submitted last year regarding additional coal storage facilities; on improvements to the Settling Basin, still hold good, but it was found impossible to commence this work during the present year. In connection with the proposed coal storage facilities, I would recommend the installation of a new unloading derrick, and improvements to the coal conveying devices.

Attention is directed to the table of statistics appended hereto, in form recommended by the New England Water Works Association, which gives in concise form the general data regarding the Water Works System.

In conclusion I wish to express my appreciation to the President, and Members of the Board, and to all the officers of the Board for their continued assistance and co-operation in carrying out the work.

Very respectfully,
THEODORE A. LEISEN.
General Superintendent.

SUMMARY OF STATISTICS

In form recommended by the New England Water Works Association.

Detroit Water Works,
Detroit, Wayne County, Michigan.

GENERAL STATISTICS

Population by United States Census of 1910, 465,766.
Date of construction, 1827.
By whom owned. The Board of Water Commissioners of the City of Detroit.
Source of supply, Detroit River, near Lake St. Clair.
Mode of supply, pumping.

PUMPING STATISTICS

Builders of pumping machinery—

- One 24,000,000 gallon, Compound Beam, Detroit Locomotive Works, Detroit, Michigan.
- One 24,000,000 gallon, Compound Beam, Riverside Engine Works, Detroit, Michigan.
- One 30,000,000 gallon, Compound Beam, Riverside Engine Works, Detroit, Michigan.
- One 24,000,000 gallon, Triple Expansion, E. P. Allis & Co., Milwaukee, Wis.
- Two 25,000,000 gallon, Triple Expansion, Allis Chalmers Co., Milwaukee, Wis.
- One 25,000,000 gallon, Triple Expansion, Holly Mfg. Co., Buffalo, N. Y.
- Three 30,000,000 gallon, Triple Expansion, Bethlehem Steel Co., South Bethlehem, Pa.

Description of fuel used—

a. Kind, bituminous, run of mine.
b. Brand of coal. Meadowbrook, W. Va.
c. Average price of coal, per gross ton (2,240 lbs.) delivered at Water Works........ $3.64
d. Percentage of ash, from Laboratory Analyses........ 9.16%
e. Wood, price per cord, none used.

Coal consumed for the year, 54,604,010 lbs.
Amount of other fuel used, none.

Total pumping for the year—

High Service	13,765,140,500 gallons
Low Service	38,275,113,750 gallons
Total	52,040,254,250 gallons

An allowance of 3% slip for all engines has been made in these quantities, and they represent the actual metered consumption.

Average static head against which pumps work—

High Service	65.0 lbs.	150.0 ft.
Low Service	49.1 lbs.	113.3 ft.
Whole System	54.3 lbs.	125.3 ft.

Number of gallons pumped per pound of equivalent coal, 953.

$$\text{Duty} = \frac{\text{Gallons pumped x } 8.34 \text{ (lbs.) x } 100 \text{ x dynamic head}}{\text{Total Fuel Consumed.}} = 99{,}600{,}000$$

Cost of pumping, figured on pumping station expenses, $181,539.91.
Per million gallons pumped, $3.49.
Per million raised one foot (dynamic), $.028.

STATISTICS OF CONSUMPTION OF WATER

Estimated total population at date (City of Detroit)	808,327
Estimated population on lines of pipes	861,427
Estimated population supplied	861,427
Total consumption for the year	52,040,254,250 gallons
Passed through meters	29,509,010,557 gallons
Percentage of consumption metered	56.7%
Average daily consumption	142,576,039 gallons
Gallons per day to each inhabitant	165.5
Gallon per day to each consumer	165.5
Gallons per day to each tap	991
Cost of supplying water, per million gallons, figured on total maintenance	$7.56
Total cost of supplying water, per million gallons, figured on total maintenance plus interest on bonds	$8.96

STATISTICS RELATING TO DISTRIBUTION SYSTEM

Mains

Kind of pipe, cast iron.
Sizes, from 2-inch to 48-inch.

Extended during year	271,416 feet	51.4 miles
Discontinued during year	6,414 feet	1.21 miles
Total now in use	5,552,072 feet	1051.53 miles
Cost of repairs per mile		$5.36
Number of leaks per mile		0.19
Length of pipes less than 4 inches diameter		10.11 miles
Number of hydrants (public) added during the year		356
Number of hydrants (public) now in use		7420 and 205 H. P.
Number of cisterns now is use		516
Capacity of cisterns		3,772,000 gallons
Number of stop gates added during the year		447
Number of stop gates now in use		11,519
Number of blow-offs		920
Number of stop gates smaller than 4 inch		27

Range of pressure on mains, 16 lbs. to 65 lbs.

SERVICES

Kind of pipe, lead and cast iron.
Sizes, ⅝ inch to 12-inch.

Number of service taps added during year	11,868
Number now in use	143,898
Average length of service, approximately 30 feet.	
Numbers of meters added	18,551
Number now in use	65,542
Percentage of services metered	46%
Percentage of receipts from metered water	56.0%

FINANCIAL STATISTICS

Receipts

Assessment rates	$ 520,432.76	
Meter rates	1,025,932.82	
Delinquent, etc	9,561.45	
Total from consumers		$1,555,927.03
Miscellaneous receipts	$ 168,376.86	
Interest	15,432.54	
		183,809.40
		$1,739,736.43

Expenditures

Water Works Maintenance—		
Operation, management and repairs	$ 565,119.53	
Interest on bonds	72,845.00	
	$ 637,964.53	
Depreciation account	174,643.75	
		$ 812,608.28
Balance		$ 927,128.15

Disposition of balance, devoted to construction work—

Valuation of works	$13,659,089.45
Value of real estate	867,029.18
Bonded debt	1,947,000.00
Amount of Sinking Fund	106,172.58
Average rate of interest	3½% plus

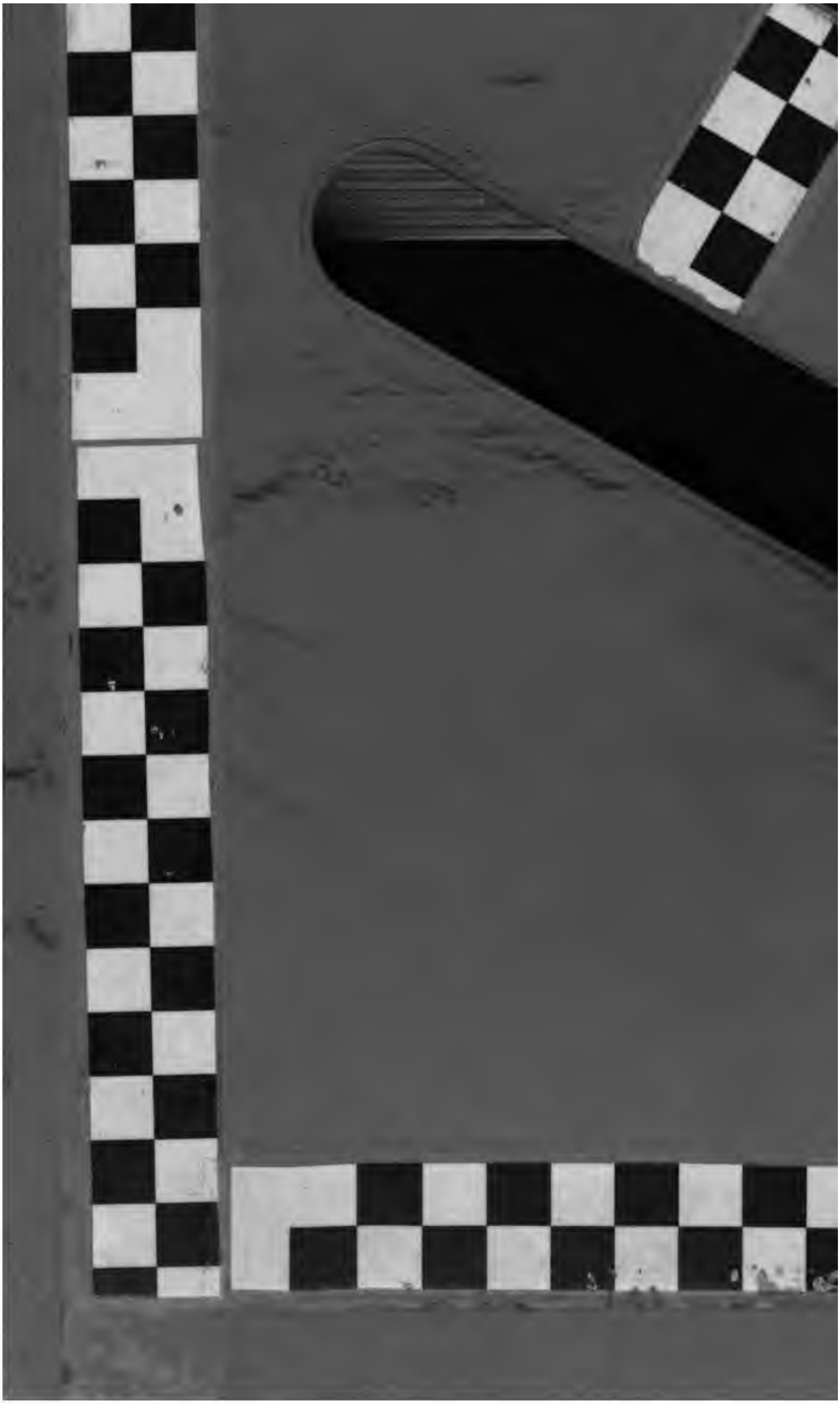
ROLL OF COMMISSIONERS AND THEIR TENURE OF OFFICE

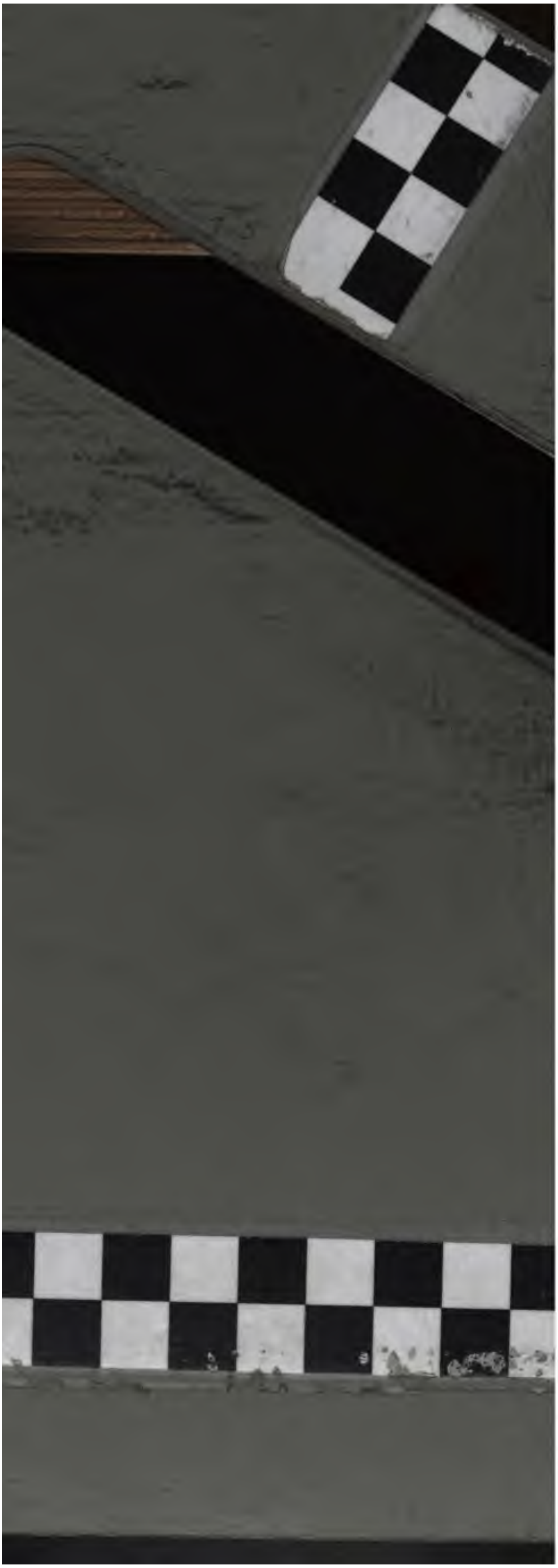
James A. Van Dyke	1853	1855	Died.
Edmund A. Brush	1853	1868	Resigned.
Henry Ledyard	1853	1859	Resigned.
Shubael Conant	1853	1859	May 1st.
William R. Noyes	1853	1865	Resigned.
Alexander D. Frazer	1855	1871	May 1st.
Julius D. Morton	1859	1865	Died.
John V. Ruehle	1859	1861	Resigned.
Chauncy Hurlbut	1861—1863	1868—1885	Died.
Stanley G. Wight	1863	1868	May 1st.
Jacob S. Farrand	1865	1890	May 1st.
John Owen	1865	1879	May 1st.
Caleb Van Husan	1868	1872	May 1st.
Samuel F. Hodge	1871	1879	Resigned.
Elijah Smith	1872	1877	May 1st.
Micheal Martz	1877	1887	May 1st.
James Beatty	1879	1885	Died.
John Pridgeon	1879—1884	1886—1891	May 1st.
Marshall H. Godfrey	1884	1889	Resigned.
Edwin F. Conley	1885	1886	May 1st.
Samuel G. Caskey	1885	1895	May 1st.
Joseph Nagel	1887	1890	Died.
August Goebel	1889—1894	1897—1898	Resigned.
Henry M. Duffield	1890	1895	May 1st.
Joseph L. Hudson	1890	1894	May 1st.
Frank E. Kirby	1891	1896	May 1st.
Albert L. Stephens	1894	1897	May 1st.
D. W. H. Moreland	1894	1896	Resigned.
Clarence A. Black	1894	1894	Resigned.
Edward W. Pendleton	1894	1909	May 1st.
Darius D. Thorp	1895	1905	May 1st.
John P. Huckestein	1896	1897	Resigned.
John W. McGrath	1896	1901	May 1st.
Joseph J. Noeker	1898	1902	May 1st.
James W. Millen	1897	1898	May 1st

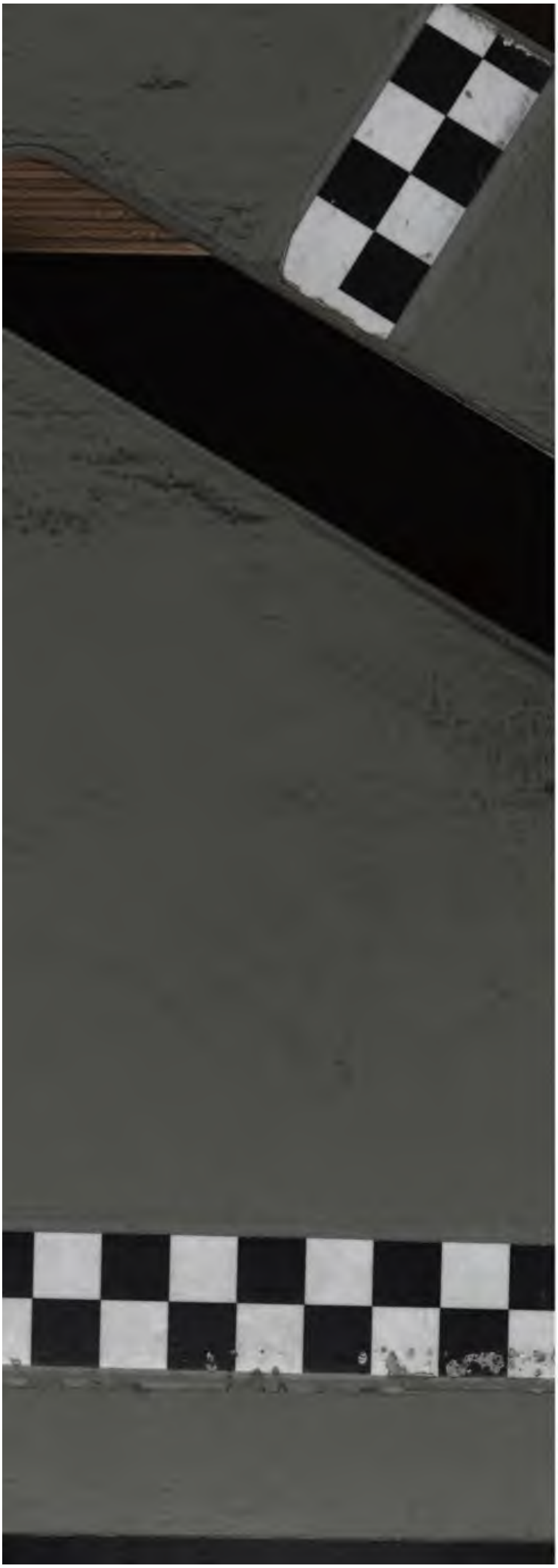
James Meathe	1898	1899	Died.
Benjamin Guiney	1899	1900	Resigned.
John Zynda	1900	1908	May 1st.
Joseph J. Crowley	1901	1906	May 1st.
John Shroeder	1902	1907	May 1st.
John F. Dodge	1905	1910	May 1st.
Frederick J. Clippert	1906	1911	May 1st.
James H. Pound	1907	1912	Resigned.
Basil A. Lemke	1908	1913	May 1st.
James Wilkie	1909	1914	May 1st.
John Gillespie	1910	1913	Resigned.
Thomas F. Comerford	1913	1914	Resigned.
George Lane	1911	1916	May 1st.
James J. Brady	1912	1917	May 1st.

MEMBERS OF THE BOARD, 1916-1917.

ROBERT OAKMAN
EMIL STROH
ALEX. DOW
BENJ. F. GUINEY
JOHN B. SOSNOWSKI







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SIXTY-SIXTH
NUAL REPORT
e Board *of* Water
mmissioners of
City *of* Detroit

the Year Ending
une 30th, 1918

SIXTY-SIXTH ANNUAL REPORT

OF THE

BOARD *of* WATER COMMISSIONERS

OF THE CITY OF DETROIT

TO THE

COMMON COUNCIL *of* THE CITY *of* DETROIT

TOGETHER WITH THE REPORTS OF
THE OFFICERS OF THE BOARD

FOR THE YEAR ENDING
JUNE 30, 1918

ALBERT P. TERNES
VICE-PRESIDENT

ROBERT OAKMAN

BENJ. F. GUINEY
PRESIDENT

ALEX. DOW

JOHN B. SOSNOWSKI

GEORGE H. FENKELL
SUPERINTENDENT AND GENERAL MANAGER

H. S. STARKEY
SECRETARY AND OFFICE SUPERINTENDENT

HARRY W. GOULD
SUPERINTENDENT OF PUMPING STATION

J. W. LOEFFLER
AUDITOR

pri. Lib
of
J. Hoad
9-32

BOARD OF WATER COMMISSIONERS OF THE CITY OF DETROIT

MEMBERS

BENJ. F. GUINEY
ALBERT P. TERNES
ALEX. DOW
JOHN B. SOSNOWSKI
ROBERT OAKMAN

COMMITTEES

Ways and Means	Commissioners OAKMAN and TERNES
Extension and Construction	Commissioners SOSNOWSKI and DOW
Water Works Park	Commissioners DOW and OAKMAN
Supplies	Commissioners TERNES and SOSNOWSKI

The President is ex-officio member of each committee.

OFFICERS

President	BENJ. F. GUINEY
Vice-President	ALBERT P. TERNES
Secretary	HARRY S. STARKEY
General Manager	GEORGE H. FENKELL
General Superintendent	THEODORE A. LEISEN
Auditor	J. W. LOEFFLER
Chief Engineer at Pumping Station	HARRY W. GOULD
Bookkeeper	GEORGE BARRIE
Cashier	D. C. GROBBEL
Permit Clerk	LOUIS MONTGOMERY
Chief Clerk, Rate Department	WALTER C. BOWEN
Chief Clerk, Meter Department	CHAS. F. GILMER

BOARD OF WATER COMMISSIONERS OF THE CITY OF DETROIT

ASSESSED AND METER RATES

From July 1, 1918

ASSESSED RATES

	Per annum
For family, household purposes, each family	$ 6.00
Horses, each	1.20
Cows, each	1.00
Boarding houses, in addition to family rate, each boarder or roomer	.50
Estimated quantities of water, each 1,000 gallons	.10
Automobiles, each	1.50
Bath tub, for families, each	1.20
Bath tub, for public, each	4.00
Automatic water closets, for family, 1st closet	2.00
Automatic water closets, each additional	.60
Rod water closets, not less than	8.00
Urinals, not less than	2.00
Wash hand basin, for family, each	.50
Wash hand basin, for other purposes, each person	.15
Hose bibb or connection, premises 30 ft. front or less	1.40
Hose bibb or connection, premises 20 feet to 60 feet	1.60
Hose bibb or connection, premises 60 feet to 100 feet	2.00
Special rates for larger grounds.	
Fountains	10.00 to 20.00
Street sprinklers, each wagon	50.00
Business places, 2 employees or less	5.00
Business places, 3 to 10 employees	10.00
Business places, more than 10 employees	20.00

WATER RATES
for
BUILDING and CONSTRUCTION PURPOSES

Brick	.5c per M.
Plaster	.7c per 100 sq. yds.
Concrete	$1.00 per 100 cu. yds.
Concrete, 6 inches thick or less	.20 per 100 sq. yds.
Tile	.05 per 100 sq. ft.
Each perch stone	.01

	No. Basement	Complete Basement
One story frame	$0.50	$0.75
Two story frame	.75	1.00
One story brick	.75	1.00
Two story brick	1.00	1.25
Two family frame	1.00	1.50
Two family brick	1.50	2.00

Where there is a waste of water an increase of rates will be made.

METER RATES

First 1,000 cu. ft., per quarter, **$1.00** minimum charge.
Next 3,000 cu. ft., per quarter, **50c** per 1,000 cu. ft.
All additional, **85c** per 1,000 cu. ft.

ANNUAL REPORT
THE BOARD OF WATER COMMISSIONERS OF THE CITY OF DETROIT

July 1, 1917, to June 30, 1918

TO THE HONORABLE
The Common Council of the City of Detroit.

Gentlemen:—

The Board of Water Commissioners of the City of Detroit respectfully presents its annual report for the fiscal year ending June 30, 1918.

The total receipts for the year were $2,867,000.56 and the total disbursements were $3,034,872.96. The total pumpage for the year was 52,816,963,375 gallons, an increase of 1½% over that of the previous year. The average daily consumption of water was 144,704,009 gallons, equal to a daily per capita consumption of 152 gallons, based on a population of 950,000 inhabitants for the city of Detroit and the environs supplied.

During the year 111.5 miles of new water mains were completed. The work of metering all service connections has been going forward steadily during the year, and on June 30, 1918, there were 94,630 meters in service.

The study of filtration as applied to the Detroit Water Works began last year has been continued with satisfactory results.

The shop work on the two engines under contract with the Worthington Pump & Machinery Corporation is proceeding slowly on account of war conditions, but it is expected the erection of one, at the Pumping Station, will be started this winter.

Report in detail of the work performed during the year follows:

Respectfully submitted,

BENJ. F. GUINEY,
ALBERT A. TERNES,
ALEX DOW,
JOHN B. SOSNOWSKI,
ROBERT OAKMAN.
Commissioners.

FINANCIAL STATEMENT

July 1, 1917			
Cash on hand			$ 4,949.63
Cash in Bank—			
General Fund		$ 88,168.00	
Outstanding Checks		1,172.65	
			86,995.35
Sinking Fund			106,172.58
Hurlbut Fund			6,446.68
Secretary Fund		$ 210.94	
Outstanding Checks		16.00	
		194.94	
Cash on Hand		805.06	
			1,000.00
			$ 205,564.24
Receipts for year ending June 30, 1918			2,855,000.56
			$3,060,564.80
Disbursements for year ending June 30, 1918			3,009,413.21
Balance—			
Cash on Hand		$ 4,035.41	
Cash in Bank—			
General Fund	$ 33,504.18		
Outstanding Checks	10,419.79		
		23,084.39	
Sinking Fund		21,633.53	
Hurlbut Fund		1,398.26	
Secretary Fund	547.83		
Outstanding Checks	60.01		
	487.82		
Cash on Hand	512.18		
		1,000.00	
			$ 51,151.59

FIRST AND OLD DETROIT NATIONAL BANK

BOARD OF WATER COMMISSIONERS,

City of Detroit,
Detroit, Mich.

Gentlemen:—

This is to advise you that the balance standing to the credit of the following accounts, as shown on our books at the close of business June 29th, 1918, was as follows:

Secretary Fund	$ 547.83
Sinking Fund	21,633.53
General Fund	33,504.18
Hurlbut Fund	1,398.26

Your very truly,

W. E. WINKLER,
Auditor.

Cost of Water Service Operations for the Year Ending June 30th, 1918

Pumped per Meters at Pumping Station—52,816,963,375 Gals.

				Per Million Gallons
PRODUCTION COST				
Collection and Purification System:				
Chemical treatment	$ 17,677.16			
Operation of filtration and intake system	2,083.15			
Maintenance of collection and purification system	12,092.78			
Depreciation of collection and purification system	7,859.20			
Direct cost of collection and purification system		$ 39,712.29		$ 0.75
Steam power cost:				
Fuel for pumping	$157,534.21			
Wages for firemen and helpers	41,506.71			
Maintenance of power plant and buildings	9,781.49			
Depreciation of power plant and buildings	8,068.44			
Direct steam power cost		216,890.85		4.11
Cost of Operating Pumps:				
Wages of assistant engineers and helpers	$ 49,376.46			
Oils, waste and supplies	4,101.28			
Maintenance of pumping plant and buildings	2,967.39			
Depreciation of pumping plant and buildings	28,416.32			
Direct cost of operating pumps		84,861.45		1.60
Superintendence and General Expense		5,250.51		0.10
Proportion of Overhead Expense:				
Proportion of engineering dept. expense	$ 7,678.77			
Proportion of administration and general expense	1,027.22	8,705.99		0.16
Total proportion of overhead expense				
Total cost of water delivered to mains			$355,421.09	$6.72
DISTRIBUTION COST				
Distribution System Cost:				
Repairing main leaks	$ 23,090.82			
Repair and maintain gates and wells	22,565.93			
Flush mains and blow off dead ends	3,402.49			
Repair trenches, walks and lawns	8,021.63			
Depreciation of pipe lines	142,259.98			
Depreciation of emergency station	209.80			
Direct distribution cost		199,550.65		$3.78

Operation and Maintenance Service Connections:				
Repair service leaks	$ 5,677.79			
Repair and maintain drinking fountains	1,725.03			
False report of leaks	454.87			
No water and short supply	1,651.56			
Shut-off and let on	1,035.79			
Miscellaneous inspection	1,347.40			
Direct service cost		11,892.44		0.22
Proportion of Overhead Expense:				
Proportion of storage yard expense	$ 31,141 27			
Proportion of engineering dept. exp	7,678.77			
Proportion of administration and general expense	40,972.86	79,792.90		1.52
Total proportion of overhead expense				
Total distribution cost			$291,235.99	$5.52

METER SERVICE COST

Meter Department Cost:				
Repair and maintain meters	$ 22,663.91			$0.43
Remove and replace meters	6,845.10			$0.13
Depreciation of meters	14,441.63			0.27
Direct meter cost		43,950.64		$0.83
Proportion of Overhead Expense:				
Proportion of storage yard expense	$ 9,116.30			
Proportion of administration and general expense	99,832.77			
Total proportion of overhead expense		108,949.07		2.06
Total meter service costs			$152,899.71	$2.89

S U M M A R Y

Total cost of water delivered to mains	$355,421.09	$6.72
Total distribution cost	291,235.99	5.52
Total cost of water pumped and delivered	$646,657.08	$12.24
Total meter cost	152,899.71	2.89
TOTAL	$799,556.79	$15.13

CONSTRUCTION REPORT

Year Ending June 30th, 1918

Work in Process July 1, 1917		$1,348,160.99
Pay Roll	$385,474.75	
Materials	778,066.71	
Cartage	30,221.08	
		1,193,762.54
Overhead Expense:		
Storage Yard Expense	$147,182.38	
Engineering Dept.	35,834.26	
Administration and General Expense	6,002.81	
		189,019.45
		$2,730,942.98
Completed Work Transferred to Plant Accounts:		
Water Mains, Gates and Wells	$2,079,778.67	
Collection and Purification Plant	100,777.10	
Water Works Park Improvements	26,377.67	
Pumping Plant No. 2	11,814.32	
Pumping Plant No. 1	561.27	
Steam Power Plant	350.33	
		2,219,659.36
Work in Process June 30, 1918		$ 511,283.62

NET REVENUES

Year Ending June 30th, 1918

Water Service Operations:		
Assessment Rates	$ 484,752.81	
Meter Rates	1,602,845.69	
Shutting off and letting on	346.32	
Percentages on delinquent accounts	11,497.00	
Total Rvenue from water service	$2,099,441.82	
Cost of water service operations	799,556.79	
Net gain from water service operations		$1,299,885.03
Miscellaneous Revenue:		
Estimates paid for pipe lines	$ 43,385.78	
Bonuses paid for pipe laid	31,660.40	
Meter Bonuses	13,139.60	
Miscellaneous Revenue	6,412.74	
Interest earned on General Fund	3,630.80	
Interest earned on Sinking Fund	1,469.60	
Sales of Misc. Work and Materials	3,896.61	
Plumbers' license	1,099.50	
		104,695.03
City of Detroit General Tax Levy		75,000.00
Income from Hurlbut Fund		4,820.94
		$1,484,401.00
Water Works Park Expense	$ 34,592.07	
Interest paid on loans	8,330.55	
Interest paid on bonds	79,262.77	
Guards for Pumping Plant	55,443.44	
Miscellaneous	6,078.20	
		183,707.03
		$1,300,693.97

BALANCE SHEET

Year Ending June 30th, 1918

ASSETS

Current Cash and Bank Accounts:	
Current cash	$ 4,035.41
Cash in bank:	
General Fund	23,084.39
Hurlbut Fund	1,398.26
Secretary's Fund, bank balance and cash on hand	1,000.00
	$ 25,482.45
Accounts Receivable:	
Meter rates	$ 135,654.80
Assessment rates	18,983.10
Miscellaneous	15,281.31
Total accounts receivable	169,919.21
Inventories:	
Stores and supplies at storage yard	$ 263,921.51
Coal at pumping station	24,978.99
Construction work in process	511,283.62
Equipment	265,228.53
Payments on pumping engine contract	112,586.95
Plans for filtration plant	7,348.16
Total inventories	$ 1,185,347.76
Plants:	
Collection and purification plant	$ 680,097.71
Steam power plant	314,074.82
Pumping plant No. 1	1,016,705.23
Pumping plant No. 2	1,022,984.68
Water mains. gates and wells	14,209,669.88
Meters in service	832,864.07
Public drinking fountains	8,981.45
Storage yard building and improvements	84,759.38
Emergency station	15,723.91
Main office building	54,288.00
Water works park improvements	185,559.34
	$18,425,708.47
Less reserve for depreciation	2,696,522.74
Total value of plants	$15,729,185.73
Real estate	867,029.18
Sinking Fund	121,633.53
Total	$18,102,633.47

LIABILITIES

Current Liabilities:	
Vouchers payable	$ 143,263.94
Accrued interest on bonds	25,892.88
1918-19 assessments	13,114.16
Accrued pay roll	1,596.47
Loan from 1st and Old Detroit National Bank	295,000.00
Notes payable	50,000.00
Loan from Sinking Fund	100,000.00
Unclaimed pay roll money	261.13
	$ 629,128.58
Special Liabilities:	
Liability to injured workmen	3,584.20
Bonded indebtedness	$ 2,122,000.00
Reserves:	
Sinking Fund	$ 121,633.53
Hurlbut Fund	1,398.26
	$ 123,031.79
Surplus	$15,224,888.90
	$18,102,633.47

BONDED INDEBTEDNESS

The following table shows the dates of issue and amount of bonds of this department outstanding at this date. The total amount issued by the Board during its existence is $4,165,000, of which $300,000 were refunded and $1,743,000 redeemed, leaving a balance due of $2,122,000.

				Rate of Int.	Redeemed Refund	Out-standing
1873	Jan. 10, 1895	Jan. 10, 1925	$ 100,000	4%		$ 100,000
1869	Feb. 1, 1900	Feb. 1, 1930	200,000	3½%	$ 20,000	180,000
1873	Jan. 1, 1903	Jan. 1, 1933	50,000	3½%		50,000
1873	Sept. 1, 1903	Sept. 1, 1933	150,000	3½%		150,000
1901	June 1, 1904	June 1, 1934	200,000	3½%		200,000
1901	Aug. 1, 1904	Aug. 1, 1919	100,000	4%		100,000
1901	Feb. 1, 1905	Feb. 1, 1935	150,000	3½%		150,000
1901	Aug. 1, 1908	Aug. 1, 1938	250,000	3½%	75,000	175,000
1901	July 1, 1909	July 1, 1939	200,000	3½%	98,000	102,000
1901	Oct. 1, 1912	Oct. 1, 1932	240,000	4%		240,000
1913	Mar. 1, 1914	Mar. 1, 1944	500,000	4%		500,000
1913	Aug. 1, 1917	Aug. 1, 1947	175,000	4%		175,000
			$2,315,000		$193,000	$2,122,000

Respectfully submitted,

H. S. STARKEY,
Secretary.

ANNUAL REPORT OF THE GENERAL MANAGER

For the Fiscal Year Ending June 30, 1918

THE BOARD OF WATER COMMISSIONERS:

Gentlemen::—

Your General Manager hereby submits for your consideration some data relating to the present condition and future requirements of the water works of the City of Detroit.

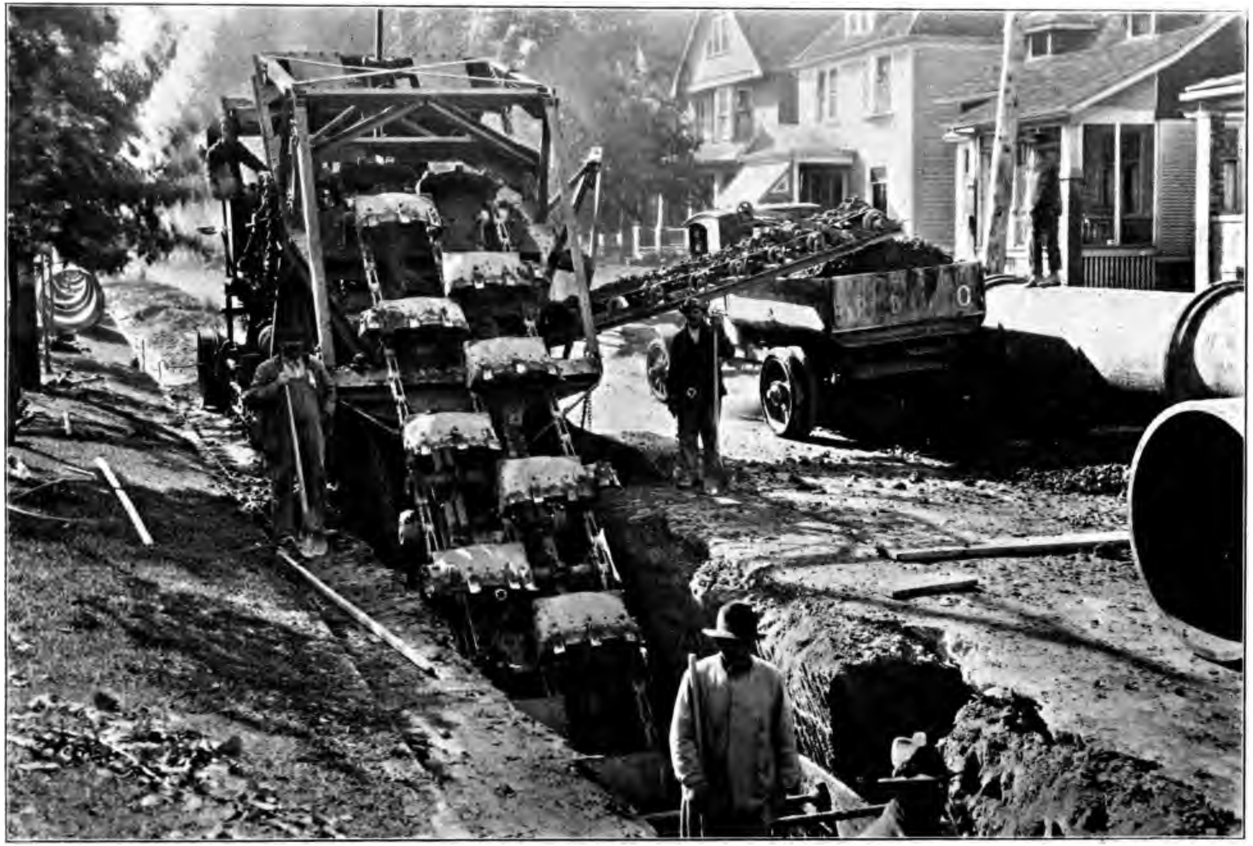
In dealing with water works affairs, it is necessary to keep in mind that the Detroit City Charter makes it the duty of the Board to supply the city with "a sufficient quantity of pure and wholesome water," etc. Further, that any comprehensive report of the system must include a consideration of each part, beginning at the intake and ending at the consumer's penstock, and including pumps, pipes, fuel supply, meters, valves, and all apparatus and tools used for maintenance and operation. A healthy growth requires that each part shall be enlarged and improved according to the work which it must perform, for failure will occur in the weakest point.

POPULATION AND GROWTH

Based on the number of families in Detroit as determined by the Water Board, the census for each of the years between the U. S. census was computed with great accuracy until 1914, since which year, because of the large number of meters installed and the lack of the family count on metered connections, the population as determined by the Water Board can be considered as only approximate. The estimated population by years since 1910 is as follows:

U. S. Census.....	1910	465,766
B. W. C. Estimate	1911	501,138
" Estimate	1912	538,928
" Estimate	1913	571,372
B. W. C. Estimate	1914	595,000
" Estimate	1915	678,746
" Estimate	1916	734,562
" Estimate	1917	808,327
" Estimate	1918	900,100

The average increase in population per decade from 1860 to 1910, was 60 per cent; from 1900 to 1910 it was 63 per cent, and it is estimated that the increase from 1910 to 1920 will equal 117 per cent. From this data and allowing for the recent increase from annexations of territory, it is believed that for the purpose of this report an increase of 69 per cent in ten



TRENCHING MACHINE DIGGING DITCH 72" WIDE, FOR 42" AND 48" PIPE

The average cost of laying 42" and 48" pipe by hand at present day wages is $8.70 per foot. Machinery does the work at an average cost of $3.50 per foot. As 32,057 feet of 42" and 48" pipe wer laid in the last fiscal year, a saving of over $173,000.00 was effected by this method.

years, or 30 per cent for each five year period, is a very conservative estimate. The population of Detroit is then estimated as follows:

1920	1,008,000
1925	1,310,400
1930	1,703,500
1932	2,000,000
1935	2,214,600

As further proof of the growth and development of Detroit, the following table of area, paving and sewer constructions is submitted:

Year	Area of Detroit Sq. Miles	Street Pavements in Detroit Miles	Lateral Sewers in Detroit Miles	Main Sewers in Detroit Miles
1895	28.35	259	267	147
1900....	28.35	278	327	160
1905....	28.75	318	358	179
1910....	40.79	372	500	190
1915....	41.76	490	530	214
1918....	78.78	634	600	236

CONSUMPTION OF WATER

The average daily per capita consumption in seven lake cities is as follows:

City	In 1910	In 1917
Buffalo	317	339
Chicago	220	245
Erie	192	116
Detroit	185	152 (Year 1917-18)
Milwaukee	95	126
Cleveland	94	110
Duluth	...	85

From this it appears that Detroit is about midway between the extremes, and that while the pumpage in Buffalo, Milwaukee and Cleveland has increased materially, there has been a decided reduction in Detroit and Erie.

These differences may be accounted for in several ways, as follows:

(1) Slippage of pumps and waste at pumping station; (2) the use of wells as a source for domestic supply, and rivers, etc., for manufacturing uses; (3) leaks in mains and service connections; (4) sprinkling; (5) allowing waste to prevent freezing; (6) leaks in fixtures and plumbing; (7) water for public and charitable purposes; (8) difference in rates, or relative cost of water to the consumer.

The loss due to pump slippage and pumping station waste, which was high previous to 1895, has been almost entirely eliminated in Detroit, as all water is metered on leaving the station.

Most of the water used for manufacturing is supplied through the city mains. Several firms using large quantities of water at very low pressure, as for condensing purposes, take water from the river through private intakes, but these cases are few relatively, for the greater part of the manufacturing plants are located along the railroads some distance removed from the river. There are probably 1,200 wells in use in Detroit located in the newly annexed districts, and this number is decreasing rapidly.

Leaks in mains are less frequent than was formerly supposed, and this is also true of service connections, although to a lesser degree. Since 1893 all mains have been tested to a water pressure of from 80 to 100 pounds per square inch, and previous to March, 1918, such tests were made in the open trench.

The use of water for lawn sprinkling, to prevent freezing, and the waste because of leaks in fixtures and plumbing, is rapidly coming under control through the general use of meters.

Large quantities of water are furnished free of charge for public and charitable purposes. For example during the past year 319,060,000 gallons were supplied Belle Isle, for which the Board would receive $16,807.83, if charged for at the present regular rate, or at the rate of $46.05 per day. The maximum daily consumption for Belle Isle was, July 25th, 1917, 1,520,000 gallons; the minimum January 21st, 564,500 gallons; and the average for the year 985,000 gallons.

According to a careful estimate made in 1910, 7½ per cent of all water pumped during the fiscal year 1908-9 was used for public and charitable purposes. It is believed that this has now been increased to some extent, and that metering all connections as far as can be done reasonably, and charging each department and institution with all the water it uses, may reduce the quantity of water so used thirty per cent. without causing inconvenience or working harm.

As the Detroit system is of the direct pressure type, without reservoir, the pumps must carry the load at all times.

Placing the average pumpage at 100 per cent, the pumpage for the maximum day and maximum hour for each year since 1910 is as follows:

Year	Average Pumpage during year	Pumpage during max. day of year	Pumpage during max. hr. of year
1910	100%	138%	171%
1911	100	139	176
1912	100	139	159
1913	100	135	175
1914	100	134	164
1915	100	121	152
1916	100	124	151
1917	100	133	155
1918	100	145	157
Average	100%	136%	162%

As the pumpage is highest during seasons of extreme temperatures, 140% and 175% will be used for estimating purposes for the maximum day and maximum hour respectively.

INSTALLATION OF METERS

While meters have been set during the past year at the rate of 97 per day during 300 working days, there are now 56,809 unmetered connections. Since 1910 meters have been placed as follows:

Year	No. of Taps	No. of Meters	Per Cent of Taps Metered
1910	87,822	8,827	10.1
1911	94,144	9,713	10.3
1912	101,158	10,807	10.7
1913	109,786	13,302	12.1
1914	118,410	17,051	14.4
1915	125,472	29,180	23.3
1916	134,369	46,991	35.0
1917	146,052	65,542	44.9
1918	151,439	94,630	62.5

During the winter of 1917-18, 4,088 meters were damaged by frost, of which 1,204 were located under kitchen sinks, generally in houses without basements; and 1,723 were damaged by hot water. Frozen meters, and those damaged by hot water are repaired at the expense of the user.

DOES IT PAY TO METER

Meters reduce the consumption of water by reducing waste.

Few consumers now object to meters, for it is well understood that meters benefit financially both the consumer and the city.

For example, the consumption in dwelling houses has been examined by selecting a number from all parts of the city at random:

	No. of Houses Investigated	Size of Meter	Average Cost Per Quarter	Remarks
Dwelling house	400	⅝ in.	$1.70	one family
" "	89	¾ in.	2.20	one family
" "	11	1 in.	3.40	one family
" "	142	⅝ in.	2.49	two families
" "	54	¾ in.	3.10	two families
" "	4	1 in.	5.88	two families
" "	10	⅝ in.	4.24	four families
" "	72	¾ in.	4.54	four families
" "	18	1 in.	5.45	four families
" "	17	⅝ in.	5.31	six families
" "	11	¾ in.	4.09	six families
" "	63	1 in.	6.70	six families
" "	9	1½ in.	7.42	six families

While it is not possible to determine with great accuracy what the flat rate would have been on the property listed above, a comparison of these payments with the flat rate charges for similar property will show a saving in favor of the meter charges of approximately one dollar per year per family.

It is also possible to show a great saving to the city at large due to the use of meters.

Year	Average Daily Per Capita Consumption Gallons	Per Cent of Taps Metered	Per Cent of Water Metered
1910............	183	10.1	33
1911............	177	10.3	35
1912............	187	10.7	36
1913............	175	12.1	37
1914............	171	14.4	40
1915............	162	23.3	41
1916............	163	35.0	52
1917............	165	44.9	59
1918............	152	62.5	55

From 1896 to 1912 the taps metered remained nearly constant at ten per cent, that is, during this period of 16 years only enough meters were set to cover one-tenth of the taps inserted. During this time the pumpage increased at such a rate that if allowed to continue would have reached in 1918, 195 gallons per capita per day. By increasing the number of taps metered to 59 per cent, the consumption has been reduced to 152 gallons.

The expense of setting meters and the saving effected by their use can be arrived at reasonably close, although the 65,542 in use at the beginning of the year had been increased to 94,630 at the end of the year, June 30, 1918, and part of these new accounts were turned over from the flat rate ledgers during each quarter of the year.

The size of pipes 12 inches and smaller in diameter is determined by the needs of the neighborhood for fire protection, and the cost of that portion of the distribution system would not usually be affected by the use of meters.

The average daily consumption during the past year has been 144,704,009 gallons, or say 145 million gallons, of which, in even figures, 39 million gallons were used in the high service and 106 million gallons in the low service. Had there been no increase in the percentage of meters in use since 1912 the pumpage would now be at the rate of 195 gallons per capita instead of 152, and the average pumpage per day would now be 186 million gallons, of which 50 million gallons would be for the high service and 136 million gallons for the low.

	Average Consumption in Million Gallons		Pounds friction between Pumping Station and Water Office or Cass and Amsterdam		Average pressures at Pumping Station to maintain same pressures as at present at Water Office, or Cass and Amsterdam	
	At Present	With only 10% of Taps Metered	At Present	With only 10% of Taps Metered	At Present	With only 10% of Taps Metered
High Service	39	50	11.95	19.1	65.56	72.7
Low Service.	106	136	4.19	6.1	45.57	47.5
	145	186				

At the beginning of the year there were 65,542 meters in service, and 94,630 at the end of the year. As a meter set late in the year had less effect on consumption than one set earlier, it is assumed that the number in service at the end of the first half of the year, about 80,000, is the average number to use in computing costs and effects.

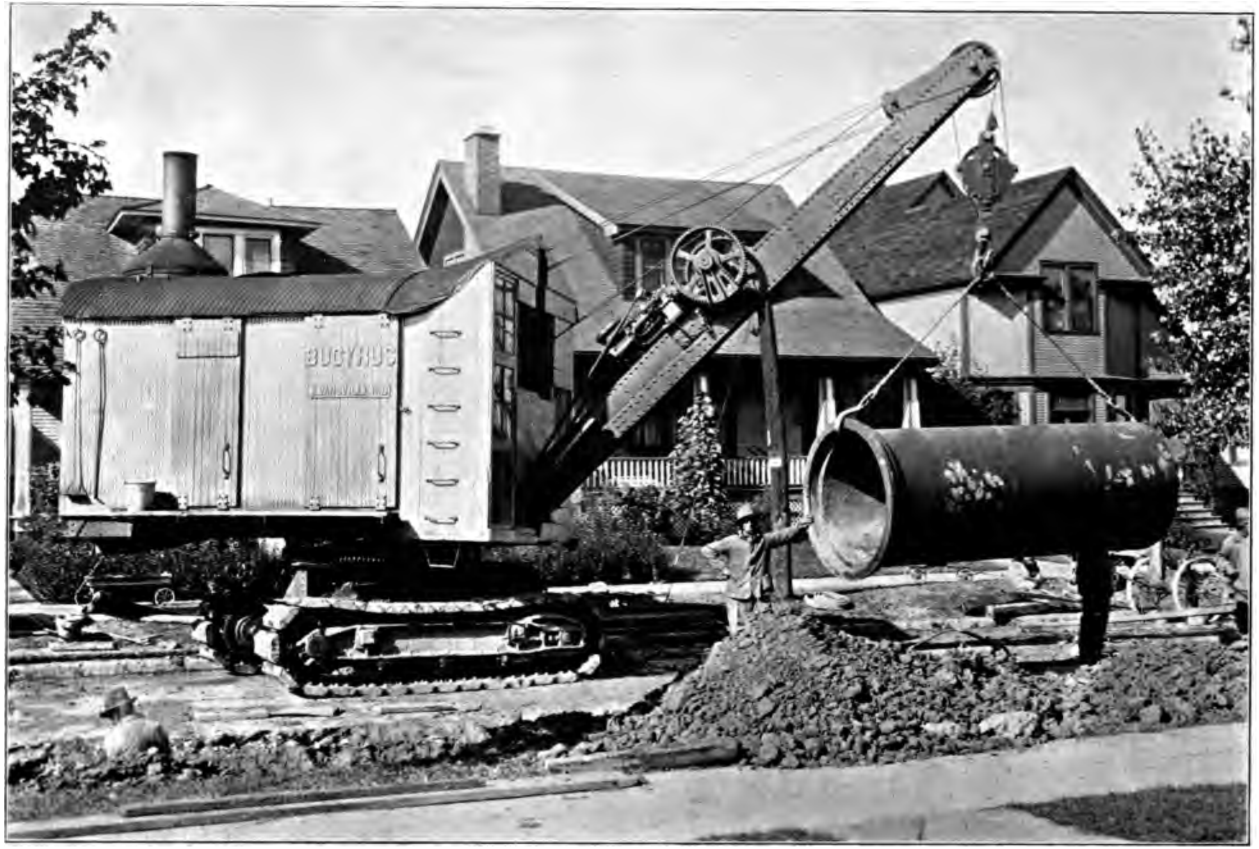
Therefore the installation of 80,000 meters, less 10% of the number of taps, or 65,000 meters, has reduced the pumping station pressures, 11% for the high service and 4% for the low service. As the pumping expense has been reduced approximately in like proportion, and as the pumping station expense during the past year was $208,518.05, there has been a credit during the year because of reduced pumpage and pressures of $69,506.00 determined as follows: (50x72.7 plus 136x45.7) divided by (39x65.56 plus 106x45.57)=133.3%. $208,518.05 x 33.3%=$69,506.00.

The further credit due to construction work made unnecessary because of reduced consumption due to meters set since 1912 will now be determined:

Item	Total Cost	Cost per Million Gallons		
Intake	$ 204,000		$ 785	
Pumps, present	1,087,116	$4,181		
Pumps, under construction	627,375	2,413		
Pumps, booster	53,000	204	6,798	
Station, old	258,068	991		
Station, new	647,375	2,490		
Station, booster	307,000	1,180		
Boilers, etc.	294,887	1,136		
Miscellaneous	32,034	123	5,920	
Land and Improvements	860,225		3,309	
P. S. Force Mains	375,300		1,440	
Conduits	319,614		1,230	
Canal, etc.—Canal	35,295	135		
Basin	36,980	143		
Dock	13,575	52	330	
Force mains, 16 in. to 48 in. in diameter	7,965,856		30,638	$50,450

The interest charge and depreciation charge per million gallon capacity is computed and shown in the following table:

Item	Cost per Million Gallons	Interest Charge at 4½%	Depreciation Rate	Depreciation Charge	Interest Charge plus Depreciation Charge
Intake	$ 785	$ 35.33	1½%	$ 11.78	$ 47.11
Pumps, etc.	6,798	305.91	2	135.96	441.87
Stations	5,920	266.40	1½	88.80	355.20
Land and Improvements	3,309	148.91	...	.....	148.91
P. S. Force Mains	1,440	64.80	1½	21.60	86.40
Conduits	1,230	55.35	1	12.30	67.65
Canal, etc.	330	14.85	2	6.60	21.45
Force Mains	30,638	1,378.71	1½	459.57	1,838.28
		$2,270.26		$736.61	$3,006.87



LOWERING 48" PIPE, WEIGHING 10,900 LBS., WITH STEAM CRANE

Employing hand labor, 14 men are required to lower pipe and handle the derrick at a cost of $6.70 per pipe. The steam crane employing 4 men, does the same work at a cost of $1.88. About 2,700 pieces of pipe were handled during the year.

The saving of 41 million gallons per day in pumpage during the past fiscal year because of meters set since 1912 represents a credit in interest and depreciation of 41 million gallons x $3,006.87, or $123,282. This, added to the credit in pumping station expense, $69,506.00, gives the total yearly credit due to meters of $192,388.00.

The average cost to the Board of meters in place has been $6.78, divided as follows:

Cost of meter	$6.48
Setting meter	.30
	$6.78

Thus the installation of 65,000 meters represents an investment of $454,700, and the interest and depreciation at 7% amounts to $31,829.00.

The yearly cost per meter follows:

Repairs	$0.22
Reading	0.30
Overhead	0.065
Total	$0.585

65,000 meters at $0.585 equals $38,025 and the total yearly expense amounts to $69,854. This expense subtracted from the credit of $192,788 shows the saving to the city during the past year due to meters set since 1912 in excess of 10% of the taps in service of approximately $122,934.

In computing the saving due to meters, it should be borne in mind that no charge has been made because of cost to the consumer in preparing the plumbing for meter. While this cost is comparatively slight for new houses, it is estimated that for both old and new the average cost is $10.00 each, or $650,000 for 65,000 meters. Seven per cent of this amount is $45,500, so that if this is deducted from the saving due to meters previously stated, $122,934, and it is not at all certain that such a deduction should be made, there still remains a balance in favor of meters of $77,434.

In many cases these figures are based on costs of work which have been completed some time, as for example, the intake crib and tunnel, which cost $204,000. Future work of this kind will cost more than double this amount. Then, too, the construction of large force mains in the immediate future, the laying of a considerable quantity of pipe in the down town district, and the building of a filtration plant, will all tend to increase the cost of supplying water and thus increase the saving due to meters.

It also pays to meter, because the careful, conservative consumer is not compelled to stand part of the cost of his neighbor's waste.

The many tons of coal saved during the past winter in Detroit through meters represent a much greater saving than can be expressed in dollars.

PRIVATE FIRE LINES

The rules of the Board permit the installation of lines of water pipe in private property for fire protection. No charge is made for the connection to the water mains beyond the regular cost of making the tap, and all water used through such lines for extinguishing fires is supplied free.

There are now 383 private fire lines in service, of which 106 are metered, an increase of 152 lines in the past seven years. The unmetered lines are provided with check valves, sealed valves, recording gages, test cocks, etc., scarcely two lines being alike in all details, and the Board is dependent on inspection from time to time to prevent the use of water from unmetered lines for other than fire purposes. The piping in many cases is quite complicated and much is either buried in the ground or covered by walls and floors. Several years ago the Board directed that all new fire lines should be metered, but this action was revoked on July 23, 1913.

The only objection that can be found to metering a fire line is the expense necessary to provide the meter, setting, well, etc.; inspection only cannot prevent entirely the use of water from such lines for purposes other than extinguishing fires; and all water taken from such lines, no matter how it may be used, is free water.

PIPE FOR FIRE PROTECTION

The size of water pipes 12 inches and less in diameter is nearly always determined by the needs of the neighborhood for fire protection. The value of all pipes in the distribution system of the size mentioned is $5,682,342. One-third of this value is charged to fire protection and it is believed that this estimate is conservative. It will be seen that the Board has a present investment for fire protection of $1,894,114. This great investment has been made notwithstanding the fact that neither the Act of Incorporation of the Board which was approved February 14, 1853, nor the Charter of the City of Detroit make any mention of the providing of fire protection as one of the duties of the Board, further than to state that the Board shall furnish "a full supply of water for public or private use in the city." Allowing 4½% for interest and 1½% for depreciation, the annual cost for this service amounts to $132,588.

INTAKE CRIB AND TUNNEL

The river tower or intake is located slightly above and near Belle Isle, in 28 feet of water at mean stage, and water flowing by the intake passes within 300 feet of Belle Isle. The tower is an eight-sided timber crib terminating four feet below the water surface, filled with concrete, and containing a center well and 24 cast iron ports; a concrete superstructure, oval in form, and faced with concrete masonry; a circular crib house with sandstone walls, glazed green tile roof, octagonal copper covered lantern and copper cornice. The crib is 67 ft. 11 inches by 52 ft. 8 inches over all; and the crib house is 37 ft. inside diameter with walls 19 ft. 5 in. above the floor.

The river water enters the chamber in the river tower through the cast iron ports or inlets, passes down through a brick-lined steel shaft with an inside diameter of 10 ft. to the river tunnel of the same diameter, and thence under the river to the shore shaft, which is also 10 ft. in diameter inside. The center of the tunnel is at elevation plus 31, or 63.5 ft. below mean level of the river, and the distance between centers of the intake shaft and shore shaft is 3,149.5 ft.

The capacity of the tunnel depends on the stage of water in the river. In the following table the capacity, or pumpage possibilities, are given for different stages of the water in the river with (1) the pumps now installed and one 37 million gallon pump now under construction (No. 11); (2) with the two 37 million gallon pumps now under construction (Nos. 11 and 12) for the new stations; and (3) with Nos. 11 and 12 in service, and with still another pump of 37 million gallons capacity (No. 13) installed in the new station. In all cases it is assumed that all pumps in the new station are in operation.

River Elevation	With 4 Pumps in New Station (Nos. 8 to 11 incl.) Balance in Old Station Million Gallons Per Day	With 5 Pumps in New Station (Nos. 8 to 12 incl.) Balance in Old Station Million Gallons Per Day	With 6 Pumps in New Station (Station Filled) (Nos. 11 to 13 incl.) Balance in Old Station Million Gallons Per Day	Remarks
90	226	261	259	89.9 is lowest elevation
91	220	266	279	recorded.
92	234	269	297	97.7 is highest elevation
93	239	273	310	recorded.
94	244	276	314	See 49th Annual Re-
95	250	280	315	port, 1901
96	264	285	316	

As the daily capacity of the pumps will approximate or exceed 378 million gallons per day when No. 13 has been set, and as the capacity of the pumps with those now under construction included will at least amount to 341 million gallons, and allowing for shut-downs for repairs, etc., it is apparent that either a new tunnel must be constructed with the least possible delay or some method must be found for increasing the capacity of the present tunnel and intake.

BOOSTER STATION

By installing a booster station in connection with the intake tunnel, with two low-lift centrifugal pumps of 100 million and 65 million gallons capacity respectively, and raising the water supplied the old station from 9.6 feet to 13.6 feet, the pumping capacity in million gallons per day will be increased to the amounts shown in the following table:

Pumping Possibilities after Booster Station is Built. Million Gallons per Day

River Elevation	Pumpage At New Station	Available For Booster Station	Limit Of Old Station	Total With Booster	Total Without Booster	Made Available By Booster
90	127	191	177	304	226	78
91	127	210	177	304	229	75
92	127	228	177	304	234	70
90	164	141	141	305	261	44
91	164	161	161	325	266	59
92	164	179	177	341	269	75
93	164	196	177	341	273	68
90	201	81	81	282	259	23
91	201	103	103	304	279	25
92	201	122	122	323	297	26
93	201	141	141	342	310	32
91	127	210	177	304	229	75
92	127	228	177	304	234	70
93	164	196	177	341	273	68

The Booster Station can be designed to later become a part of the low lift pumping station for a filter plant.

FILTRATION PLANT

Investigations and studies by Mr. R. Winthrop Pratt, Consulting Engineer, have been under way for more than a year past to determine the feasibility, cost and best type of filtration plant for the whole water supply when conditions require such an installation. These studies have been advanced sufficiently to determine that it is feasible to build a rapid sand filtration plant on land now owned by the Board just south of the new pumping station, utilizing and rebuilding the present settling basin to serve as a storage reservoir for filtered water.

The plans as developed contemplate a low lift pumping station to raise the river water delivered by the intake tunnel from 28.6 feet to 33.6 feet, to elevation 115.0, or about 21 feet above mean water in the river, to mixing chambers where a coagulant will be applied. The water will then remain about two hours in coagulant basins of about 27 million gallons capacity from which it will be conducted to 72 rapid sand filters, each having a sand area of 1,000 square feet, and a daily capacity of 4 million gallons. The coagulated and settled water will pass through the sand bed in the filters, be collected and delivered to the covered storage reservoir built on the site of the present settling basin. This storage reservoir will have a capacity of 36 million gallons and the service pumps will raise the water from the reservoir to the city.

The plant will be designed for extension up to over 400 million gallons daily capacity.

During the months that the experimental filter has been in operation, the maximum turbidity of the water has been 490 parts per million; sulphate of alumina has been used at an average rate of 0.67 grs. per gallon and at a maximum rate of 1.68 grs. per gallon; and lime and sulphate of iron at the average rate of 0.68 grs. and 0.67 grs. per gallon, and at the maximum rate of 1.15 grs. and 1.00 grs. per gallon respectively.

The additional cost of filtration over the present cost of supplying water will consist of interest, depreciation and sinking fund charges on the investment, cost of coagulant, low lift pumping, and labor for operation of the plant. While no detailed estimates of cost have yet been made, and prediction of future prices is extremely difficult, it is expected that the additional cost will not exceed 6 cents per thousand cubic feet, or $8.00 per million gallons.

The pollution of the Detroit River has been very carefully investigated by the International Joint Commission and the City of Detroit. The results of the work done by the city is contained in a report issued by the Department of Public Works, "Preliminary Report on Sewage Disposal for the City of Detroit," by Mr. Clarence W. Hubbell, Consulting Engineer, and dated May 9, 1916.

The following appears in that report on page 14:

"The unpreventable and inevitable pollution from surface drainage, street wash and other incidental sources, is of such degree and character that even the treatment of all sanitary sewage entering the river on both sides of the boundary and the complete sterilization of all pollution from vessels would not obviate the necessity for purification of Detroit River water used for drinking and domestic purposes."

In 1911, the writer, then Civil Engineer to the Board, called attention to the possibility at times of a reversal of flow in the Detroit River. The normal fall from the St. Clair Flats to Fort Wayne is about one foot, and from Fort Wayne to Amherstburg about twenty-one inches. As an example of the reversal of slope, on the morning of February 6th, 1911, there was a fresh east wind blowing and it was snowing. The following are hourly scalings from records of the automatic guages on that date, as determined by the United States Lake Survey:

Hours	Fall in Feet	
A. M.	Flats to Fort	Fort to Amherstburg
1	0.18	0.03
2	0.11	—0.27
3	—0.09	—0.10
4	—0.12	—0.16
5	—0.03	—0.38
6	—0.16	—0.06
7	0.05	—0.02
8	0.30	0.10
9	0.39	0.17

On the above date, for about five hours, the surface of the river at Amherstburg was higher than the surface of Lake St. Clair and the Flats, the maximum difference being 0.41 feet or about five inches. A careful search of the United States Lake Survey records will show other instances of reversal of flow.

PUMPING STATION

It is estimated that the daily pumpage in 1925 will be 146 gallons per capita, and with an estimated population of 1,310,400, the average pumpage will amount to 190 million gallons per day, and the maximum hourly pumpage to 175% of the average, or 332 million gallons per day. This will require the operation at rated capacity of 12 out of 13 pumps.

The seven pumps in the old station have a combined capacity of 177 million gallons, and the three pumps in the new station 90 million gallons per day additional. Two additional pumps for the new station with a combined capacity of 74 million gallons were contracted for December 26, 1916, and there is space for one more, or the sixth pump, in the new station. Four of the pumps in the old station, Nos. 1, 2, 3, and 4 can only be used for the low service.

The following boilers are in use:

Boiler Number	Maker	When Installed	Boiler Horse-Power	Total Boiler Horse-Power
4, 5, 6, 7	Wicks Horizontal	1896	225	900
8, 9, 10, 11	Wicks Vertical	1899	225	900
1, 2, 3	Wicks Vertical	1906	333	1,000
12, 13, 14, 15	Wicks Vertical	1912	400	1,600
				4,400

Boilers Nos. 4, 5, 6 and 7 are only allowed 110 lbs. pressure.

Plans are now being prepared to extend as soon as possible the boiler house in the rear of the old station and install two 400 H. P. boilers, with room for a third boiler.

The coal sheds have a capacity when partly trimmed of 11,000 tons. These sheds and the coal conveyors are old, while the unloading crane and crusher are new and in good condition.

The timber and pile dock at the entrance to the canal is in need of repairs. The canal is 40 feet wide and 14 feet deep. The river front shore line above the canal is still some distance back from the harbor line, but a sea-wall is required because of the current, to protect the bank, before the filling can be extended farther.

It is becoming very difficult to secure a boat to haul coal, of a size and draft that can enter the canal, and at the time best suited for the department.

FORCE MAINS

Detroit is supplied with force mains as follows:

Street Location	When Laid	Size Inches Diameter	Safe Capacity Million Gallons Per Day
Jefferson-Congress	1875	42	26
Cadillac-Mack	1881	42	26
Jefferson-Champlain	1895	42	26
Hurlbut-Sylvester	1902	42–36	26
Kercheval-Waterloo	1908	48	39
Bewick-Forest	1913	48	39
Garland-Charlevoix	1913	48	39
Jefferson-Sixth	1915	48	39
			260

A 48 inch main for the high service is now under construction via Garland Avenue, French Road and Six-mile Road to meet the 48 inch main already laid in Six-mile Road at Dequindre Street. As soon as this main is completed work should be started on another main for the low service via St. Paul, Mt. Elliott, Fort, Hastings and Elizabeth to Sixth Street.

PIPEAGE SYSTEM

The pipeage system of the Detroit Water Works consists of 1,190 miles of cast iron pipe, ranging in diameter from 2 inches to 48 inches, and the contents of these pipes when filled is 45,431,040 gallons, or 31.4 per cent of the average daily consumption for the year 1917-18. The city and system are divided into a high service and a low service by a line which approximates a contour line fifty feet above the surface of the Detroit river. This line crosses Harper at Field, follows Palmer from the North Grand Boulevard to Theodore Street, crosses McDougall at Willis, Jos. Campau at Illinois, St. Aubin at Scott, Rivard at Brady, follows from St. Antoine to Woodward on Canfield Avenue, crosses Third Avenue at Hancock, Brooklyn at Putnam, 12th at Merrick, Grand River at Stanley, Vinewood at Moore, etc. The high service and low service are operated entirely independently of each other, and, as operated, the only connection between the two is at the pumping station.

In 1908, or ten years ago, 20 per cent of all water pumped was used in the high service and 80 per cent in the low, while in 1917-18, 26.9 per cent was used in the high and 73.1 per cent in the low.

The pressure on the low service pumps is varied from hour to hour to give an uniform pressure of about 28 pounds per square inch at the water office; and likewise the pressure on the high service pumps is varied so that a pressure of about 29 pounds is maintained at fire engine house No. 5, at Cass and Alexandrine Avenues.

A comparison has been made between the amounts of water pipe of various sizes in Detroit and in Cleveland, Milwaukee, Buffalo, Cincinnati, Toronto, St. Louis, Louisville and Columbus.

Pipe smaller than four-inch: Detroit has 11.2 miles or 0.8%, Cincinnati, 9.1 miles, Columbus, 12.1 miles, and other cities very little or none at all.

Four-inch pipes: Detroit has 154.6 miles or 13%; Cincinnati, 163.4 miles or 21.6% and Louisville, 61.4 miles or 14.9%; while all other cities have much less, Cleveland, 44.4 miles or 4.5%; Milwaukee, 4.4 miles or 0.7%; Buffalo, 40.6 miles or 6.7%; Toronto, 15.5 miles or 2.7%; St. Louis, 2.4 miles or 0.24% and Columbus, 25.1 miles or 6.9%.

Six-inch pipe:—All cities but Cincinnati have a larger percentage of six-inch pipe than Detroit—Detroit, 565.7 miles, or 47.5%; Cleveland, 55.4%; Milwaukee, 70.5%; Buffalo, 59.2%; Cincinnati, 44.1%; Toronto, 71.2%; St. Louis, 61.1%; Louisville, 55.4% and Columbus, 51.3%.

Eight-inch pipe:—The amount of eight inch pipe in Detroit has increased since 1908 from 11.8% to 233.5 miles, or 19.7%. At present Detroit leads all the cities in this size, except Columbus with 22.1%. The average for seven cities is 6.5%.

Ten-inch pipe:—Detroit has 47.4 miles, or 4%. The average for seven cities is 3.6%, while no pipe of this size is used in Milwaukee.

Twelve-inch pipe:—Detroit has 51.2 miles and the percentage, 4.3%, is less than in all cities but Columbus, 1.1% and Cincinnati, 3.95%, Toronto has 100 miles or 17.3% and St. Louis has 179 miles or 18%.

Sixteen-inch pipe:—Detroit has 23.6 miles, or 1.9%, St. Louis, none; Toronto, 4.2 miles, or 0.7%; Buffalo, 58.7 miles, or 9.7%; Cincinnati, 27 miles, or 3.6%; Louisville, 3%.

Twenty-inch pipe:—Detroit has practically no twenty-inch pipe, while it is used very generally in other cities. St.

Louis has 88.1 miles, or 8.9%; Buffalo, 15.6 miles, or 2.6%; Cleveland, 0.6%; Milwaukee, 1.5%.

Twenty-four-inch pipe:—There are 26.8 miles, or 2.3%, in Detroit; none in St. Louis; 12.7 miles in Cincinnati, or 1.68%; 20% in Cleveland; 0.39% in Milwaukee; and 8 miles, or 1.4% in Toronto.

Thirty-inch to sixty-inch pipe:—The practice in these cities is given in the following table:

City	Miles of Pipe					Percentage of Total				
	30	36	42	48	60	30	36	42	48	60
Detroit	10.3	6.1	31.0	29.2	..	0.9	0.5	2.6	2.5	..
Cleveland	31.5	16.6	6.0	7.2	..	3.2	1.7	0.6	0.7	..
Milwaukee	11.5	12.9	0.3	..	..	2.1	2.4	..	..	..
Buffalo	0.5	26.8	..	8.1	0.8	..	4.4	..	1.3	0.1
Cincinnati	5.0	19.4	2.6	3.7	2.3	0.7	2.56	0.3	0.4	0.3
St. Louis	30.3	44.1	..	0.3	..	3.4	4.4	..	..	..
Louisville	10.5	6.8	..	8.3	..	2.5	1.6	..	2.0	..
Columbus	..	3.9	..	..	..	..	1.1	..	..	..
Toronto	2.1	16.4	0.6	..	..	0.4	2.8	0.1	..	..

Compared with cities given above, Detroit has an excess of pipe four inches in diameter and less, and not enough twelve and sixteen-inch pipe. Although the laying of four-inch pipe in large amounts was discontinued in 1892, there are now 34.4 miles of this small pipe in use in the district between Trumbull Avenue and Dequindre Street, and south of Warren Avenue. Of this, 5.15 miles were laid in or before 1856.

The maximum allowable loss of head between the Pumping Station and the water office is found as follows:

Maximum presure at Pumping Station.....		60 lbs.
Elevation of gauge at Water Office, lbs.....	14.36	
Pressure maintained at Water Office........	28.00	
Friction at Pumping Station...............	4.64	47 lbs.
Friction between Pumping Station and Water Office		13 lbs.

As the distance is 4 miles, the friction is 3 lbs. per mile, or 1.32 ft. per thousand. Using this loss of head and 124 as the value of C in the Williams-Hazen formula, it is found that a 42-inch pipe will deliver 26 million gallons and a 48-inch pipe 37 million gallons per day. Assuming a maximum rate of consumption of 175% of the average, and 150 gallons per day per capita, it is found that a forty-two inch pipe will supply a population of 100,000, and a forty-eight inch pipe 142,000.

Size of Pipe	Cost per Square inch of Area Based on Cost of 1918 Work	Relative Discharge per Square Inch	Cost of Area of Cross-Section which will Deliver 1,000 Gallons in 24 Hours. Loss of Head 0.1 ft. per 1,000
6	5.0c	100	5.0c
8	3.4c	121	2.8c
10	2.8c	157	1.9c
24	2.1c	245	0.86c
36	1.7c	316	0.54c
48	1.2c	379	0.32c

The number of gallons of water contained in the entire pipeage system since 1895 is as follows:

Year	Contents in Gallons Entire Pipeage System	Miles of Pipe in System	Gallons per Mile of Pipe	Diameter of Pipe Required to Contain Gallons per Mile. Inches
1895	12,172,650	501	22,374	10.2
1900	13,180,012	572	23,061	10.35
1905	16,084,049	663	24,261	10.6
1910	21,246,061	775	27,410	11.3
1915	34,037,109	957	35,581	12.85
1918	45,431,040	1,190	38,168	13.3

WATER PRESSURES

			1904	1909	1914	1917
Location	1895	1900	1905	1910	1915	1918
Pumping Station Low Service	50.28	50.27	50.04	53.11	47.1	45.57
Eng. No. 7, Concord near Jefferson	29.25	32.76	35.31	36.72	34.2	28.40
Water Office, Randolph and Jefferson	25.72	27.76	28.32	28.11	26.1	26.98
Eng. No. 3, Griswold and Clifford	28.89	29.03	30.00	29.19	28.3	27.75
Eng. No. 8, Sixth and Baker	25.56	29.11	28.44	29.81	29.4	28.32
Eng. No. 4, 18th near Howard	29.68	26.66	30.22	29.48	28.8	29.25
Eng. No. 10, 16th and Bagg	26.62	25.29	27.81	26.92	26.9	25.42
Eng. No. 15, Hubbard near Fort	30.03	27.16	30.13	31.71	30.1	30.03
Eng. No. 14, Scotten near Michigan	24.98	27.69	29.02	29.19	32.0	27.48
Eng. No. 22, Michigan nr. Hammond	....	26.50	27.13	26.59	27.0	26.62
Eng. No. 18, Mt. Elliott nr. Sylvester	21.44	24.86	24.69	25.49	21.7	20.49
Eng. No. 6, High near Hastings	18.25	29.85	20.46	21.50	20.6	20.16
Storage Yard	....	17.35	18.28	19.12	16.2	15.04
Eng. No. 5, Alexandrine near Cass	17.20	18.40	19.06	19.04	17.4	16.53
Eng. No. 12, 16th and Grand River	16.86	16.36	20.03	19.54	20.0	18.81
Eng. No. 20, Baldwin and Gratiot	....	24.90	27.37	26.77	21.6	19.02
Pumping Station High Service	50.28	50.27	59.95	71.75	64.7	65.56
Eng. No. 12, 16th and Grand River	16.86	16.36	....	....	24.6	29.55
Eng. No. 13, Fort and Lewerenz	12.51	17.11	28.06	28.87	28.1	26.97
Eng. No. 17, Cass and Amsterdam	17.04	17.71	29.03	28.31	25.9	27.31
Eng. No. 21. Lincoln near Piquette	....	16.48	28.98	28.75	23.7	26.15
Eng. No. 24, Kenilworth near John R	....	....	26.97	26.33	26.4	26.34
Storage Yard		....	....	....	31.7	26.85

By this table it will be seen that pressures averaged 25 pounds during the past year; 25.8 pounds during 1914-15; 26.9 pounds during 1909-10; 26.8 pounds during 1904-5; 23.7 pounds during 1900; and 22.6 pounds during 1895. That is, that pressures are the lowest now that they have been at any time since pressures were raised in the northern part of the city by the division of the system into the high service and low service in 1902. There has also been a very decided lowering of pressures at the pumping station during the past ten years. A study of pressures throughout the city during the past year will be found on the accompanying charts.

Pressures have been lowered to lessen the number of breaks in mains, yet during the past year one break occurred in a forty-eight inch main and three in forty-two inch mains. Pressures at present are too low in the upper part of the low service; for example, the mean pressure at Orleans and Erskine is 15.04 pounds; at Alexandrine and Cass, 16.53 pounds; at Sixteenth and Grand River, 18.81 pounds.

Reports to the Board on breaks of mains in Detroit by Gardner S. Williams, Consulting Engineer, and the writer, were published in Engineering News, October 24, 1912.

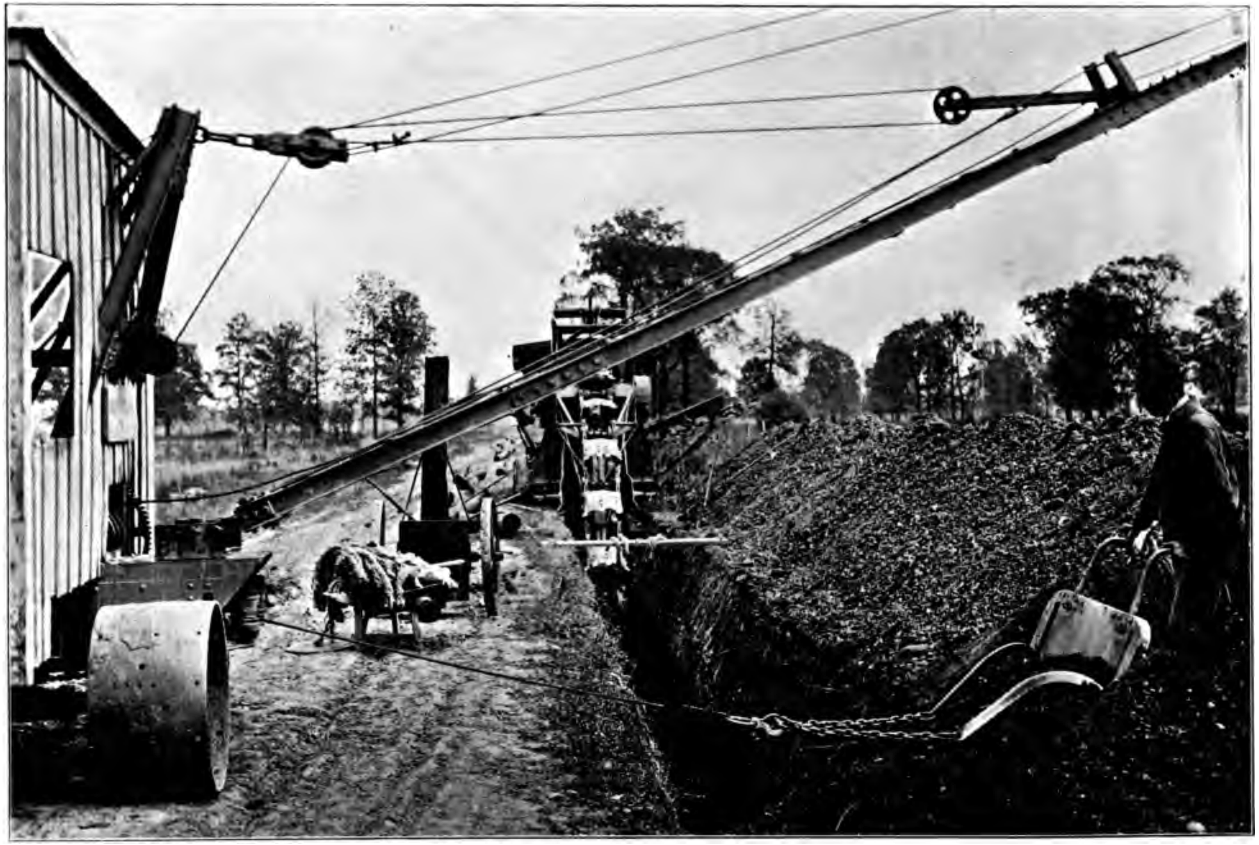
DIVISION OF SYSTEM

The system at present is divided by a line crossing Woodward Avenue at Canfield, into high and low service districts. The difference in elevation between the highest and lowest points on Woodward Avenue in the former is 15 feet, and in the latter, 45 feet. The location of these systems, with the pressures maintained in each, is clearly shown on the small maps in this report.

A NEW PUMPING PLANT

About 1925 the demand for water will have increased to such an extent that the capacity of the present pumping station, with intake, booster station, conduits, engines and force mains, will have been reached. Should filters be constructed soon, the necessary increase in rates, however slight, will cause the per capita consumption to decrease somewhat. Other causes may work to lessen the per capita pumpage, but the time when a new pumping plant will be required cannot be delayed long, and it is time even now that this matter of increased supply should receive careful consideration.

There are several plans by which it would be possible to



BACKFILLING ON DITCH 30" WIDE, FOR 6" AND 8" PIPE

Hand backfilling costs 9c per foot for a 30" ditch for 6" and 8" pipe; while the machine backfilling costs 3½c per foot. These machines backfilled about 600,000 lineal feet of 30" to 72" ditch during the year.

obtain a new and increased supply, and among these may be mentioned the following:

1. An intake in Lake St. Clair or the Detroit river above the present intake, with a filter plant and pumping station on the shore nearby, and several force mains leading across the city. This plan would be similar to the one now in use.

2. An intake in the Detroit river some distance below the center of the city, a filtration plant and pumping station on the shore nearby, as at Fort Wayne, and mains leading out from this station. While this plant might prove the cheapest, it would possibly be the least desirable because of the polluted supply.

3. An intake in Lake St. Clair or Detroit river above Belle Isle, with an intake tunnel to a point in the city some distance back from the water front, where a filtration plant and pumping station would be located. Force mains would lead out from this pumping station.

4. An intake in Lake St. Clair or Detroit river above Belle Isle; low lift pumping station on shore nearby; a low pressure main or conduit leading to a reservoir; filtration plant and pumping station placed some distance back from the water front and force mains leading away. The water works system of Highland Park has been built according to this plan.

5. An intake in the Detroit river above Belle Isle; a filter plant and low lift pumping station on reclaimed ground at the upper end of Belle Isle, and a low pressure tunnel from Belle Isle to a pumping station in Detroit.

6. A supply from Lake Huron either flowing by gravity to a pumping station in Detroit, or forced through pipes under pressure to a pumping station in Detroit. The practicability of this plan has been under discussion for many years, and it is believed that the time has now arrived when estimates should be made and other information collected which will allow definite conclusions being drawn.

STORAGE YARD

The one and only storage yard is located at Orleans and Erskine Streets. While the yard is centrally located, in order to serve the city, it is now necessary at times to haul pipe and other heavy material more than eight miles. It is not possible to do construction work economically without adequate storage facilities, and these must not only include land, but unloading equipment and paved driveways as well.

Since the present method of accounting was adopted for use at the storage yard, the construction work of the department has increased to such an extent as to make necessary changes and modifications in the system. It is also desirable that pay-roll clerks be employed to handle all of the rolls of the department.

OFFICE BUILDING

The growth of the business of the Board will make necessary interior changes in the present office building. These will include the installation of an elevator, the construction of increased vault space and the removal of partitions on the second floor.

CONSTRUCTION MACHINERY

The great amount of pipe laying work that has been carried on during the past two years in Detroit has only been made possible through the use of the most modern excavating and pipe laying machinery. The saving due to the use of this equipment has been very great, in fact it is only through its use, with skilled operators, that it is possible to carry on successfully any pipe laying or similar construction work.

ELECTROLYSIS

In 1911 the last careful electrolysis survey of the distribution system was made to determine as far as possible the localities in which trouble and damage from electrolysis might be expected, and to give an idea of the extent of the danger from this source.

AUTOMOBILES

The Board now owns 58 automobile trucks and cars of various kinds. Of these seven are used at the storage yard and by the engineering and construction forces for superintendents, inspectors and engineers. A careful inquiry has been made to determine the manner that some other cities as well as large firms and private service corporations handle this question of passenger cars.

Seven large cities report that they have had no experience with the use of automobiles owned by employees, while two report that employees' cars are used to a limited extent. All of the seven public service corporations reporting are using employees' cars on a rental basis. Thirteen large firms in

Detroit reported the use of employees' cars satisfactorily, and in nearly all cases on a monthly rental.

This plan generally employed is to allow the employee to use any kind of a car he chooses and to pay him a stated amount per month for its use.

METER ACCOUNTS

The work of handling the meter accounts has increased to such an extent as to make necessary changes in the office methods employed. An investigation of the way similar work is carried on by other large institutions has been made, and it is believed that it will be possible to introduce improved methods that will greatly reduce the quantity of the work and at the same time allow of greater accuracy.

OVERHEAD CHARGE BETWEEN CITY DEPARTMENTS

Work done by one department of the city for another department is paid for at cost plus a percentage for superintendence and overhead expense. This charge, with the four departments principally concerned, is as follows:

Department of Public Works	Cost plus	15%
Public Lighting Commission	Cost "	10%
Department of Parks and Boulevards	Cost "	15%
Board of Water Commissioners	Cost "	20%

RECOMMENDATIONS

The following recommendations are respectfully submitted:

1. Continue the placing of meters, without interruption, until all services are metered. Ninety per cent of all services should be metered by the end of the coming fiscal year.

2. That a booster station be constructed at Water Works Park.

3. Extend the boiler house at the old pumping station and install new boilers.

4. Construct a boiler house, chimney, coal bunkers, with boilers and coal handling machinery, at the new pumping station.

5. Install new coal unloading and handling machinery and provide new coal storage.

6. Install pumping engine No. 13, which is the last pump that can be placed in the new station.

7. Construct concrete sea wall along water front at Water Works Park, and consider the advisability of enlarging the canal.

8. Purchase at least two coal boats to be owned and operated by the Board.

9. Construct filter plant.

10. Divide the present "low service" district into a "low service" and "intermediate service" district.

11. Complete new 48-inch main from the pumping station to Dequindre Street, in Garland Avenue, French Road and Six Mile Rroad.

12. Lay a new 48-inch force main from the pumping station to Sixth Street, through St. Paul Avenue, Mt. Elliott Avenue, Fort Street, Hastings Street and Elizabeth Street, a distance of 29,930 feet.

13. Lay large mains as follows:

Diameter Inches	Length Feet	
		Low Service
42"	7,410	From Baker and Vinewood to Regular and Artillery, via Baker, Hubbard, Porter, Junction, Rogers, Cavalry and Regular.
36"	11,610	From Regular and Artillery to Ferndale and Baby Creek, via Regular, Leonard, Desmond, Waterman and Ferndale.
		Intermediate Service
42"	10,850	In Warren from West Grand Blvd. to Detroit Terminal Railroad.
24"	5,720	In Martin from Warren to Michigan.
36"	21,210	From Mack and Cadillac to Gratiot and Connors Creek Road, via Mack and Connors Creek Road.
24"	12,500	In Gratiot from Connors Creek Road to present City Limits.
		High Service
36"	4,200	From St. Aubin and Palmer to Ferry and St. Antoine, via St. Aubin and Ferry.
30"	5,500	From East Grand Blvd. and Sylvester to Canfield and Elmwood, via Sylvester, Meldrum and Canfield.
24"	20,700	From Milwaukee and Elmwood to Mt. Elliott and Seven Mile Road, via Milwaukee and Mt. Elliott.
24"	4,500	In Conant from Jerome to City Limits.
24"	11,720	In Woodward from Six Mile Road to Eight Mile Road.

24″	6,180	In Ford Righway from Linwood to Schoolcraft.
16″	6,560	From Ford Highway and Schoolcraft to Grand River and Turner, via Ford Highway and Turner.
16″	6,080	In Grand River from Detroit Terminal Railroad to Fullerton.
16″	6,330	In Livernois from Grand River to Tireman.

14. Each year replace with larger pipe at least three miles of old pipe in the central section of the city. This work should be done ahead of new paving.

15. Make investigation of flow of water in the large pipes now in use.

16. Make investigation, survey and estimate of cost of a new water intake and pumping system, with land, force mains, etc.

17. Purchase sites for at least two additional storage yards.

18. Remodel interior of office building.

19. As far as possible, meter and charge for all water supplied city departments and charitable institutions.

20. That the work of the Auditor regularly employed by the Board be extended to cover all accounts for material, supplies, etc.

21. Make a new organization chart and revise the rules, regulations and duties of officers and employees.

22. Materially increase the flat rates July 1st, 1918.

23. Make electrolysis survey of the distribution pipes throughout the city.

24. In cases where special kinds and bodies of automobiles are not needed, arrange to use employees' cars; the Board to pay a monthly rental and to carry the insurance; the employee to provide storage, gasoline, tires, repairs and all supplies.

25. Revise methods of keeping accounts at the storage yard and in the meter department, and introduce billing machines for preparing meter bills.

26. That all work done by one city department for another be charged at cost plus five per cent.

ESTIMATE OF COST OF WORK RECOMMENDED

The cost of laying pipe sixteen inches and less in diameter for general distribution and fire protection is not included.

1.	Finish metering all service connections		$ 409,000
2.	Construct a booster pumping station at Water Works Park		499,000
3.	Boiler house and boilers at the old pumping station		51,000
4.	Boiler house, chimney, boilers, coal bunkers, etc		353,000
5.	Coal storage, unloading and handling equipment		333,000
6.	Pumping Engine No. 13, not less than 37 million gallons capacity		205,000
7.	Sea wall at Water Works Park and enlargement of canal		95,000
8.	Filtration Plant		5,400,000
9.	Division of distribution system		83,000
10.	Complete 48-inch main in Garland Avenue and Six Mile Road		992,000
11.	New 48-inch force main from pumping station to Sixth Street		1,078,000
12.	Large mains as follows:		
	42-inch, Baker Street	$222,000	
	36-inch, Regular and Ferndale	290,000	
	42-inch, Warren Avenue	326,000	
	24-inch, Martin Avenue	77,000	
	36-inch, Mack and Connors' Creek	473,000	
	24-inch, Gratiot Avenue	169,000	
	36-inch, Ferry and St. Aubin	105,000	
	30-inch, Sylvester Avenue	96,000	
	24-inch, Milwaukee Avenue	280,000	
	24-inch, Conant	54,000	
	24-inch, Woodward Avenue	158,000	
	24-inch, Ford Highway	83,000	
	16-inch, Turner	53,000	
	16-inch, Grand River	49,000	
	16-inch, Livernois Avenue	51,000	
			2,486,000
13.	Replace ten miles of old pipe in down town district		163,000
14.	Investigate flow of water in mains		5,000
15.	Surveys and estimates for new water supply		13,000
16.	Two sites for storage yards		50,000
17.	Remodel office building		19,000
18.	Make electrolysis survey		5,000
19.	Billing machines for meter work		10,000
20.	Two coal boats		200,000
	Total		$12,400,000

Respectfully submitted,
GEORGE H. FENKELL,
General Manager.

REPORT OF THE GENERAL SUPERINTENDENT

For the Fiscal Year Ending June 30, 1918

THE BOARD OF WATER COMMISSIONERS OF THE CITY OF DETROIT.

Gentlemen:—

The following is the report of the Engineering, Construction and Operating Departments for the year ending June 30, 1918:

PUMPAGE AND DISTRIBUTION

All statements of water pumped are based upon the quantities recorded by Venturi Meters, which are 3.7% less than the amounts indicated by plunger displacement. This difference is accounted for by pump slippage and by the water used in the stations and grounds.

The total pumpage for the year was 14,194,030,000 gallons on the high service, and 38,622,933,375 gallons on the low service; making a total of 52,816,963,375 gallons for the entire system. The average daily consumption was 144,704,009 gallons, or 152 gallons per capita, based upon an estimated population supplied of 950,000.

The following tables show details of pumpage and the distribution of water in Detroit and surrounding villages:

COMPARISON OF METER AND PUMP RECORDS

Pumping Station

	Venturi Meter Measurement	Engine Plunger Displacement
Maximum day, Feb. 5, 1918	209,600,000	214,864,090
Minimum day, Nov. 4, 1917	105,613,750	110,091,930
Average daily (entire system)	144,704,009	150,216,451
Average daily (high service)	38,887,753	48,322,311
Average daily (low service)	101,894,146	105,816,255
Total for year	52,816,963,375	54,829,006,750
Maximum hour, 7 to 8 P. M. July 30, 1917 Total Pumpage	9,490,000	10,284,290
High service pumpage 7 to 8 P. M. July 30, 1917	2,730,000	3,428,470
Low Service Pumpage 7 to 8 P. M. July 30, 1917	6,760,000	6,855,820
Minnmum hour 2 to 3 A. M. Nov. 19, 1917 Total Pumpage	3,340,000	3,355,495
High Service Pumpage 2 to 3 A. M. Nov. 19, 1917	810,000	935,440
Low Service Pumpage 2 to 3 A. M. Nov. 19, 1917	2,530,000	2,420,055
Rate per day at maximum hour (entire system)	227,760,000	246,822,960
Rate per day at maximum hour (high service)	65,520,000	82,283,280
Rate per day at maximum hour (low service)	162,240,000	164,539,680
Rate per day at minimum hour (entire system)	80,160,000	80,531,880
Rate per day at minimum hour (high service)	19,440,000	22,450,560
Rate per day at minimum hour (low service)	60,720,000	58,081,320

PUMPAGE

Recorded by Venturi Meters

MONTH	HIGH SERVICE		LOW SERVICE		TOTAL	
1917	Total Gallons	Daily Aver. Gallons	Total Gallons	Daily Aver. Gallons	Total Gallons	Daily Aver. Gallons
July	1,227,310,000	39,590,645	3,335,999,000	107,612,871	4,563,309,000	147,203,516
August	1,280,780,000	41,315,484	3,420,229,875	110,329,996	4,701,009,875	151,645,479
September	1,148,060,000	38,268,666	3,135,263,250	104,508,775	4,283,323,250	142,777,441
October	1,127,320,000	36,365,161	3,015,926,000	97,287,935	4,143,246,000	133,653,096
November	1,014,290,000	33,809,666	2,745,188,500	91,506,283	3,759,478,500	125,315,950
December	1,148,070,000	37,034,516	3,279,671,750	105,795,863	4,427,741,750	142,830,379
1918						
January	1,329,800,000	42,896,774	3,826,385,000	123,431,774	5,156,185,000	166,328,548
February	1,264,490,000	45,160,357	3,530,580,750	126,092,170	4,795,070,750	171,252,526
March	1,185,220,000	38,232,903	3,251,836,250	104,897,943	4,437,056,250	143,130,846
April	1,092,250,000	36,408,333	2,937,917,000	97,930,567	4,030,167,000	134,338,900
May	1,172,560,000	37,824,516	3,079,019,250	99,323,202	4,251,579,250	137,147,717
June	1,203,880,000	40,129,333	3,064,916,750	102,163,892	4,268,796,750	142,293,225
Year	14,194,030,000	38,887,753	38,622,933,375	105,816,256	52,816,963,375	144,704,009

CONSUMPTION OF WATER IN DETROIT AND VILLAGES

	Total Consumption Gallons	Daily Average Gallons	Estimated Population
Detroit and St. Clair Heights—Unmetered	23,838,276,475	65,310,346	
Detroit and St. Clair Heights—Metered	26,554,000,000	72,750,685	
Detroit and St. Clair Heights—Total	50,392,276,475	138,061,031	900,100
River Rouge—Metered	374,461,500	1,025,921	9,000
Ecorse—Metered	102,614,400	281,135	3,300
Hamtramck—Metered	1,824,255,300	4,997,959	35,000
Oakwood—Metered	68,647,700	188,075	2,000
Grosse Pointe—Metered	43,062,400	117,979	600
Highland Park—Metered	11,645,600	31,905	
Villages except St. Clair Heights—Total	2,424,686,900	6,642,977	
Detroit and St. Clair Heights—Total	50,392,276,475	138,061,031	
Total Consumption	52,816,963,375	144,704,009	
Total Metered	28,978,686,900	79,396,402	
Total Unmetered	23,838,276,475	65,310,346	

With the exception of St. Clair Heights, the water supply of all villages is metered at the village limits.

The Pumping Station records show a station duty of 89,507,000 foot pounds per 100 pounds of coal consumed; a decrease of 10 per cent from the preceding year. This decrease is accounted for by the inferior quality of coal received. In determining the duty, all steam used for heating and construction work is charged against pumpage. An average of 912 gallons of water was pumped per pound of coal. The cost of pumping water, exclusive of interest and depreciation, is shown below:

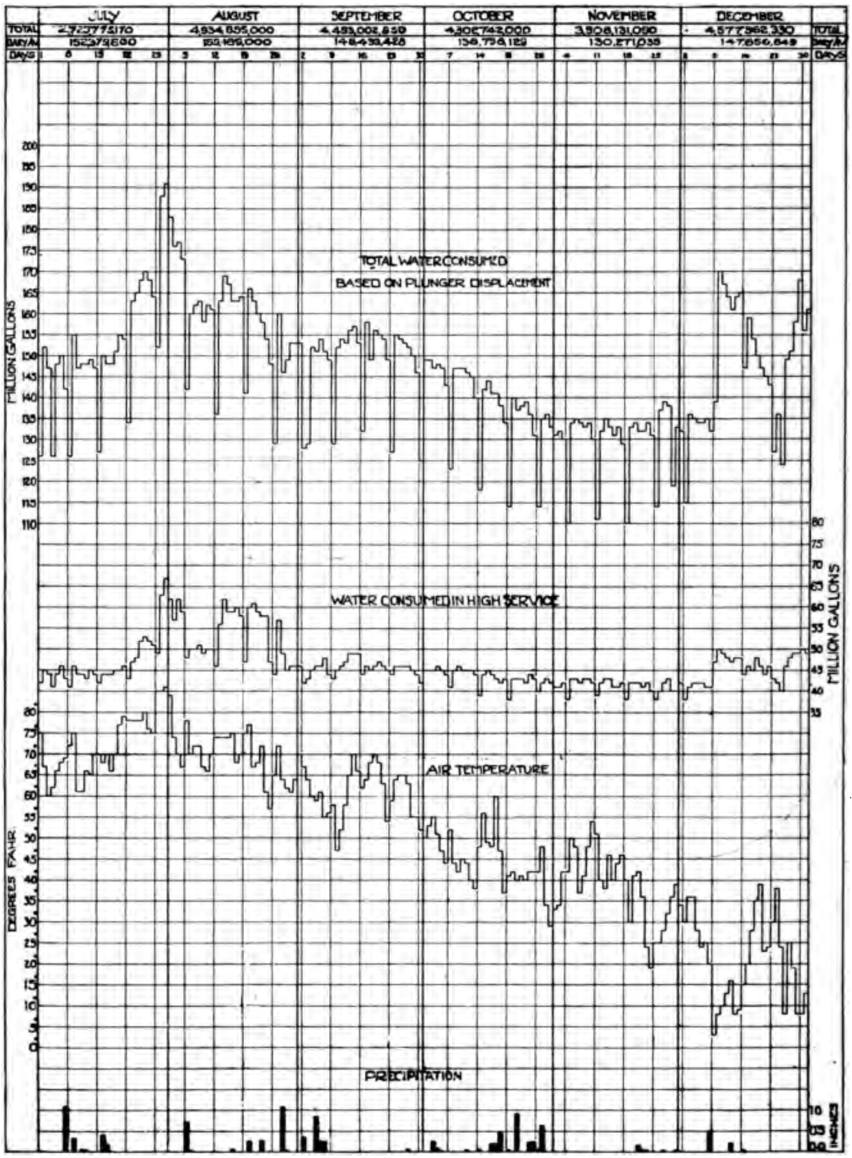
COST OF PUMPAGE

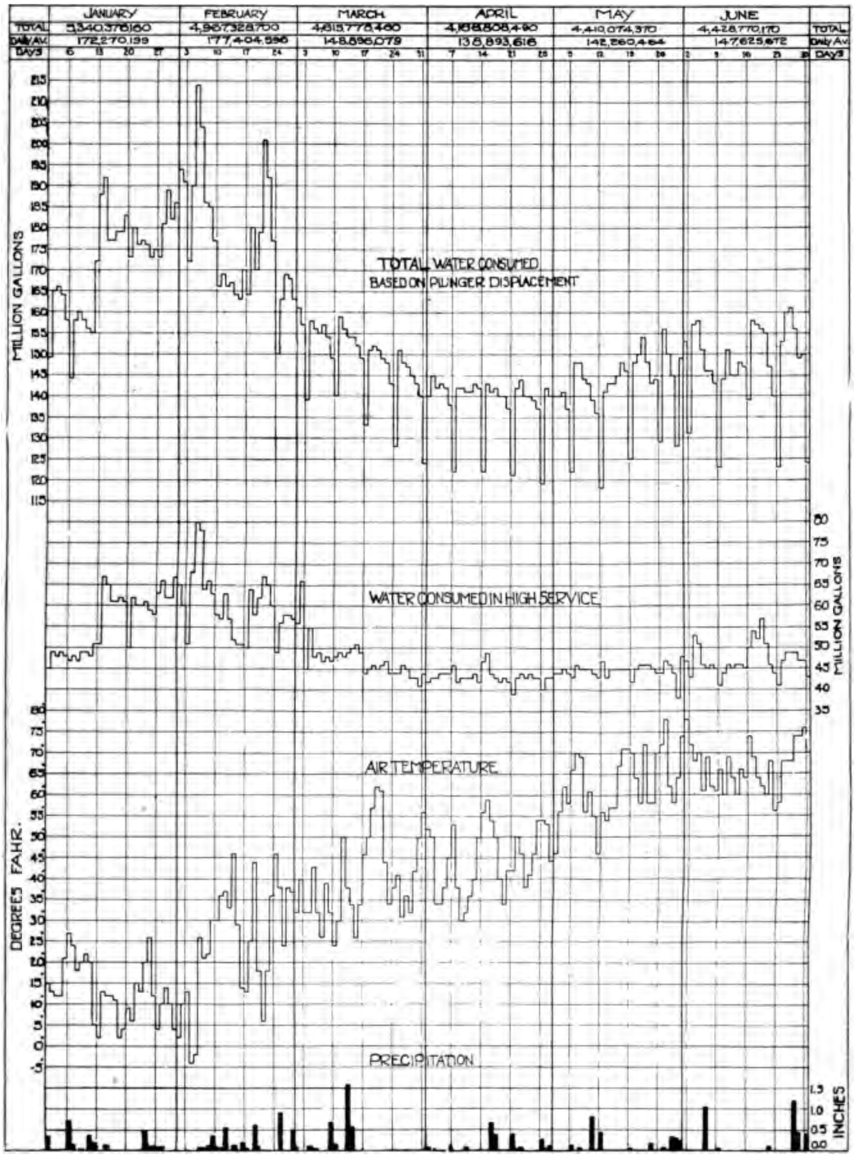
	Total Cost	Cost per Million Gallons	Cost per Million Gallons Raised 100 Ft.
Labor	$ 96,133.68	$1.82	$1.55
Fuel	157,534.21	2.98	2.53
Oil and Supplies	4,101.28	.08	.07
Miscellaneous	12,748.88	.24	.20
Total	$280,518.05	$5.12	$4.35

The pressures throughout the city are very slightly below those of the year before and are shown in the "Table of Pressures."

Table of Pressu

	LOCATION OF GAUGES	Elevation above City Datum	Pressure corresponding to diff in Elevation bet. Pump Wells and Engine Gauges	July 1, 1916, to June 30, 1917 Average Daily Pumpage 147,462,090 gallons Total Pumpage for Year 53,823,662,830 gallons				July 1, 1917, to June 30, 1918. Average Daily Pumpage 150,216,456 gallons Total Pumpage for Year 54,829,006,750 gallons				Increase or Decrease in Friction During Last Year		Maximum Hour Observed July 30, 1917 10,284,290 gals 7 p. m. to 8 p.m. Daily Rate 246,822,960gals.		Minimum Hour Observed Nov. 5, 1917 3,355,495 gals. 2 a. m. to 3 a. m. Daily Rate 80,531,880 gals.	
				Pressures, Pounds			Frictional Loss in	Pressures, Pounds			Frictional Loss in	Pounds		Average Pressure	Frictional Loss in	Average Pressure	Frictional Loss in
		Feet	Lbs.	High	Low	Mean	Lbs.	High	Low	Mean	Lbs.	Inc.	Dec.	Lbs.	Lbs.	Lbs.	Lbs.
Low Service	Pumping Station	92.00	......	53	26	49.1	......	52	42	45.57	......	......	......	45.0	......	45.3	......
	Engine No. 32, Hart and Jefferson	103.42	4.9	44	24	37.6	6.6	44	24	36.21	4.46	......	2.14	36.0	4.1	40.0	0.40
	Engine No. 26, Crane and Brinket	125.79	14.6	39	17	32.8	1.7	35	24	29.28	1.69	......	0.01	28.5	1.9	31.5	......
	Engine No. 7, Concord near Jefferson	124.77	14.2	35	12	30.8	4.1	33	20	28.40	2.97	......	1.13	26.0	4.8	29.0	2.10
	Engine No. 19, Congress near Jos. Campau	122.47	13.2	35	24	31.0	4.9	35	19	29.27	3.10	......	1.80	27.0	4.8	32.0	......
	Engine No. 2, Hastings near Congress	120.98	12.6	37	20	28.6	7.9	35	18	29.09	3.88	......	4.02	29.0	3.4	32.0	0.70
	Water Office, Randolph and Jefferson	125.18	14.4	33	20	27.7	7.0	33	17	26.98	4.19	......	2.81	25.0	5.6	27.0	3.90
	Engine No. 3, Griswold and Clifford	123.06	13.4	36	15	30.1	5.6	33	19	27.75	3.42	......	2.18	27.5	4.1	27.5	4.40
	Engine No. 8, Sixth and Baker	122.14	13.1	34	22	29.0	7.0	36	18	28.32	4.15	......	2.85	25.0	6.9	29.0	3.20
	Engine No. 4, Eighteenth near Howard	116.18	10.5	34	22	30.0	8.6	34	19	29.25	5.82	......	2.78	26.0	8.5	30.0	4.80
	Engine No. 10, Sixteenth and Bagg	125.28	14.4	33	17	28.4	6.3	32	15	25.42	5.72	......	0.55	22.5	8.1	26.5	4.40
	Engine No. 15, Hubbard near Fort	114.62	9.8	38	24	31.7	7.6	35	19	30.03	5.74	......	1.86	27.0	8.2	31.0	5.50
	Engine No. 29, Solvay and W. Jefferson	115.05	10.0	36	6	30.2	8.9	35	18	28.97	6.60	......	2.30	25.5	9.5	29.5	5.80
	Truck No. 13, Fort and Lewerenz	115.56	10.2	36	18	29.6	9.3	34	11	27.61	7.76	......	1.54	24.0	10.8	29.0	6.10
	Engine No. 27, Junction and Rogers	113.74	9.4	38	20	31.7	8.0	36	17	29.03	7.14	......	0.86	24.5	11.1	32.5	3.40
	Engine No. 14, Scotten near Michigan	121.37	12.7	......	......	......	......	34	2	27.48	5.39	......	......	24.0	8.3	28.0	4.60
	Engine No. 22, Michigan near Hammond	119.14	11.8	34	19	28.1	9.2	34	15	26.62	7.15	......	2.05	24.5	8.3	28.5	5.00
	Truck No. 10, Sheridan and Mack	140.25	20.9	27	15	23.1	5.1	27	13	22.38	2.29	......	2.81	22.0	2.1	24.0	0.40
	Engine No. 18, Mt. Elliott near Sylvester	146.23	23.5	27	13	20.9	4.7	26	11	20.49	1.58	......	3.12	17.0	4.5	22.0	......
	Engine No. 11, Grandy near Gratiot	143.21	22.2	27	13	22.5	4.4	26	12	21.53	1.84	......	2.56	21.0	1.8	23.0	0.10
	Engine No. 6, High near Hastings	142.63	21.9	29	14	19.9	7.3	25	11	20.16	3.51	......	3.79	18.0	5.1	22.0	1.40
	Storage Yard, Orleans and Erskine	150.64	25.4	20	9	15.6	8.1	20	6	15.04	5.13	......	2.97	13.0	6.6	15.0	4.90
	Truck No. 5, Russell and Erskine	147.74	24.1	29	10	17.0	8.0	22	6	17.31	4.16	......	3.84	19.0	1.9	20.0	1.20
	Engine No. 5, Alexandrine near Cass	148.48	24.5	24	10	18.1	6.5	21	5	16.53	4.54	......	1.96	17.0	3.5	17.0	3.80
	Engine No. 12, Sixteenth and Grand River	141.55	21.5	25	12	20.4	7.2	24	7	18.81	5.26	......	1.94	15.0	8.5	20.0	3.80
	Engine No. 31, Cobb and W. Boulevard	135.12	18.7	29	10	22.1	8.3	28	11	21.56	5.31	......	2.99	21.0	5.3	23.0	3.60
	Engine No. 20, Baldwin and Gratiot	145.37	23.1	26	10	20.1	5.9	25	9	19.02	3.45	......	2.45	14.0	7.9	20.0	2.20
	Average	......	......	......	16.9	27.3	......	......	15.1	25.85	......	......	......	......	......	......	......
High Service	Pumping Station	92.00	......	75	56	65.0	......	74	53	65.56	......	......	......	74.3	......	59.0	......
	Engine No. 18, Mt. Elliott near Sylvester	146.23	23.5	45	29	38.2	3.3	42	20	36.89	5.17	1.87	......	33.0	17.8	39.0	......
	Engine No. 23, Moran and Boulevard	154.29	27.0	37	19	30.2	7.8	35	10	28.91	9.65	1.75	......	25.0	22.3	31.0	1.0
	Engine No. 28, Riopelle and Milwaukee	155.56	27.5	35	17	28.2	9.3	32	40	26.84	11.22	1.92	......	22.0	24.8	29.0	2.5
	Engine No. 13, Russel and Ferry	157.30	28.3	34	18	28.0	8.7	32	13	26.97	10.29	1.59	......	24.0	22.0	30.0	0.7
	Engine No. 17, Cass and Amsterdam	152.83	26.3	35	15	28.3	10.4	34	5	27.31	11.95	1.55	......	23.0	25.0	28.0	4.7
	Engine No. 21, Lincoln near Piquette	154.88	27.2	33	13	26.7	11.1	32	4	26.15	12.21	1.11	......	21.0	26.1	27.0	4.8
	Engine No. 24, Kenilworth near John R.	155.86	27.6	33	14	26.9	10.5	34	4	26.34	11.62	1.12	......	29.0	17.7	28.0	3.4
	Engine No. 12, Sixteenth and Grand River	141.55	21.5	37	12	29.6	13.9	27	15	29.55	14.51	0.61	......	23.0	29.8	31.0	6.5
	Storage Yard, Orleans and Erskine	150.64	25.4	37	15	28.0	11.6	35	14	26.85	13.31	1.71	......	24.0	24.9	31.0	2.6
	Engine No. 1, Hamtramck	......	......	31	7	20.3	....	31	6	20.74	......	......	......	11.0	......	20.0	......
		......	...	......	19.5	31.8	......	......	13.4	31.10	......	......	......	......	......	......	......


JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
TOTAL
4,723,775,170
4,934,855,000
4,453,002,850
4,306,742,000
3,908,131,090
4,577,362,330
DAILY AV.
152,379,600
159,189,000
148,433,428
138,798,129
130,271,036
147,656,849
DAYS
1 8 15 22 29
5 12 19 26
2 9 16 23 30
7 14 21 28
4 11 18 25
2 9 16 23 30
MILLION GALLONS
200 195 190 185 180 175 170 165 160 155 150 145 140 135 130 125 120 115 110
TOTAL WATER CONSUMED
BASED ON PLUNGER DISPLACEMENT
WATER CONSUMED IN HIGH SERVICE
80 75 70 65 60 55 50 45 40 35
MILLION GALLONS
DEGREES FAHR.
80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0
AIR TEMPERATURE
PRECIPITATION
1.0
0.5
0.0
INCHES


JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
TOTAL
5,340,376,160
4,967,328,700
4,615,778,460
4,168,808,490
4,410,074,370
4,428,770,170
TOTAL
DAILY AV.
172,270,199
177,404,596
148,896,079
138,893,616
142,260,464
147,625,672
Daily Av.
DAYS
DAYS
MILLION GALLONS
TOTAL WATER CONSUMED
BASED ON PLUNGER DISPLACEMENT
WATER CONSUMED IN HIGH SERVICE
MILLION GALLONS
AIR TEMPERATURE
DEGREES FAHR.
PRECIPITATION
INCHES

Attention is called to the decrease in friction on the low service, and to the increase on the high service. The average daily amount pumped on the low service was 2,969,000 gallons less than during the preceding year; a difference of 2.8%. The 48-inch line on Jefferson Ave., from the Pumping Station to Sixth Street, was put into service on January 8, 1916, and resulted in an increase of two pounds pressure at the Water Office with two pounds less pressure at the Pumping Station. As this main was in service for only six months of the year 1916-1917, the reduced friction loss would naturally not be as evident during that year as during 1917-1918. In the report for 1916-1917 the pressures shown for Engine House No. 14 were in error, owing to a faulty gauge, and those pressures have been omitted from this report.

On the high service, the average daily pumpage was 1,175,000 gallons more than during the preceding year; an increase of 3%, with no increase in the number of mains leaving the station.

There are included in this report a series of maps showing lines of equal friction loss; lines of equal pressure as they are owing to the contour of the ground; and lines of equal pressure as they would be if all points at which pressures are taken were at the same elevation as the Pumping Station. These curves are shown both for the mean annual conditions and for the day of maximum pumpage.

WATER TREATMENT

During the year, treatment of the water supply by chlorination was continued with satisfactory results. Liquid chlorine was used at a rate which averaged 2 pounds per million gallons, and the cost was 33½ cents per million gallons treated.

The river water averaged 34 bacteria per c.c. on agar at 37° C and confirmed evidence of B. Coli in 17 out of 772 samples of 1 c.c. each, and 642 out of 3860 samples of 10 c.c. each.

The treated water showed an average of 10 bacteria per c.c. on agar at 37° C and confirmed evidence of B. Coli in only 23 out of 3875 samples of 10 c.c. each, and no positive evidence in any of the 775 samples of 1 c.c. each.

Daily bacterial analyses of river water and treated water showed the following results:

Average number of bacteria per c.c.
Gelatin at 20 deg. C—River Water 213.7. Treated Water 10.6.
Agar at 37 deg. C—River Water 33.7. Treated Water 10.0.
Agar at 20 deg. C—River Water 200.8. Treated Water 14.1.

River Water:
B. Coli in 1 c.c.—positive on 6 days—17 times in 772 tests.
B. Coli in 10 c.c.—positive on 178 days—642 times in 3860 tests.

Treated Water:
B. Coli in 1 c.c.—positive on 0 days— 0 times in 775 tests.
B. Coli in 10 c.c.—positive on 22 days—23 times in 3875 tests.

The bacterial analyses of the water for each month are shown in the accompanying table:

BACTERIAL ANALYSES OF DETROIT WATER

Summary of Monthly Averages—July, 1917—July, 1918

	RAW WATER						TREATED WATER						TAP WATER				
	Agar @ 20°	Agar @ 37°	Gelatin @ 20°	B. Coli 1 C. C.	B. Coli 10 C. C.	Turbidity	Agar @ 20°	Agar @ 37°	Gelatin @ 20°	B. Coli 1 C. C.	B. Coli 10 C. C.	Turbidity	Agar @ 20°	Agar @ 37°	Gelatin @ 20°	B. Coli 1 C. C.	B. Coli 10 C. C.
July—1917	27.4	14.3	27.2	0/50	12/250	18.2	16.3	10.3	14.9	0/50	4/250	13.6	60.9	15.8	77.8	0/25	13/125
August	364.4	142.5	799.3	0/54	6/270	19.1	5.9	5.3	6.8	0/54	0/270	17.6	20.9	12.9	14.3	0/27	6/135
September	31.5	17.0	37.5	0/48	2/240	19.2	6.3	5.1	5.2	0/48	1/240	18.0	9.7	7.6	9.3	0/24	5/120
October	62.0	27.0	48.0	4/54	86/270	32.4	8.3	6.2	3.0	0/54	4/270	33.5	10.3	4.5	13.3	0/27	3/135
November	39.0	8.5	32.5	4/49	74/245	30.3	3.0	3.2	3.4	0/50	3/250	28.2	2.9	3.2	3.7	0/25	0/125
December	130.0	5.5	36.2	2/61	59/305	27.0	3.5	3.4	3.3	0/61	0/305	26.0	4.2	3.3	2.6	0/25	0/125
January—1918	23.5	4.8	84.0	5/77	81/385	5.5	2.6	1.4	2.1	0/78	2/390	5.0	2.2	1.3	1.3	0/26	1/130
February	270.4	19.3	228.8	0/71	89/355	5.1	8.8	6.3	4.3	0/71	2/355	5.0	8.2	6.9	4.9	0/25	3/125
March	1021.0	78.6	882.2	2/78	99/390	26.9	59.8	38.8	44.1	0/78	6/390	25.0	56.4	42.4	44.8	0/26	2/130
April	358.0	65.1	330.5	0/77	29/385	63.2	44.7	28.8	35.7	0/78	1/390	63.3	30.9	22.1	29.5	0/26	0/130
May	43.1	10.8	24.3	0/78	36/390	16.8	4.3	5.4	1.7	0/78	0/390	14.9	8.9	5.3	2.6	0/26	0/130
June	38.8	11.2	39.5	0/75	69/375	16.2	5.3	5.9	3.3	0/75	0/375	16.6	14.0	6.6	11.6	0/25	1/125
Average	200.8	33.7	213.7			23.3	14.1	10.0	10.6			22.2	19.1	10.9	[illegible].9		
Total				17/772	642/3860					0/775	23/3875					0/307	34/1535

FILTRATION

The experimental filtration plant has been continued in operation during the year and regular analytical and bacterial analyses of the raw, settled and filtered water have been made and recorded. The filtered water has been maintained at a high standard of purity. The very turbid river water of April was successfully filtered.

It was originally intended that the public should have every opportunity to become acquainted with the method of operating the plant and with the quality of water produced; but the closing of the Park to visitors has rendered this impossible. An exhibit was established at the Hurlbut Gate and supplied with filtered water by a pipe line from the filtration plant. The large number of visitors to this exhibit and the quantity of water carried away by them attest the interest felt by the public in the subject of filtration.

PIPE SYSTEM

Work on pipe line construction has been hampered by difficulty in securing material and by an unprecedented shortage of labor, and only by taking advantage of the saving offered by the use of machinery to replace hand labor, was the Board able to make any considerable progress.

Trenching and backfilling machines were first employed in 1916, and in 1917 their value was so fully demonstrated that more equipment was purchased. The machines now in use by the construction department include:

1 Trench Digger, capacity 24″ wide by 8′ deep.
1 Trench Digger, capacity 28″ wide by 8′ deep.
1 Trench Digger, capacity 33″ wide by 10′ deep.
1 Trench Digger, capacity 41″ wide by 10′ deep.
2 Trench Diggers, capacity 72″ wide by 10′ deep.
3 Self-Propelling Backfillers without booms.
4 Self-Propelling Backfillers with booms.
2 Steam Cranes, Caterpillar Traction, capacity 6 tons.
1 Air Compressor.
1 Tamping Machine, hammer 9″ x 9″.
1 Concrete Breaker, hammer 700 lbs.
1 Pulsometer with boiler.
2 High pressure power driven test pumps.
12 Power driven diaphragm pumps.
1 Centrifugal pump.

The following table shows the saving effected by the use of machines:

	All Hand Labor			Dug and Backfilled by Machine			
Size	Feet Laid	Total Labor Cost	Cost per ft.	Feet Laid	Total Labor Cost	Cost per ft.	Saving by Machine per ft.
6″	59,238	$35,095.25	.59	60,407	$21,118.15	$0.35	$0.24
8″	33,161	19,108.24	.58	31,007	12,550.08	.40	.18
12″	4,628	5,159.94	1.11	5,863	2,845.80	.49	.62
16″	797	1,291.14	1.62	13,011	12,852.90	.99	.63

On the 42-inch and 48-inch pipe lines a material saving is effected by the use of mechanical appliances to replace hand labor. The following are some of the most striking instances, the figures being based upon the prevailing scale of wages.

Labor per foot in laying 42-inch and 48-inch pipe will average $8.70 by hand, and $3.50 by machinery; caulking averages $1.32 per joint by hand and $0.49 using pneumatic hammers; handling and lowering each pipe by hand labor averages $6.70 and $1.88 using the steam crane. Backfilling ditches on small lines costs about 9 cents per lineal foot by hand and 3½ cents per foot by machine.

The total amount of pipe laid is given in the table "Distribution System" as 676,121 feet, but this amount includes some pipe which was laid last year and upon which the cost reports were not completed. The amount actually laid was 588,809 feet, or 111.5 miles, of which 8.2 miles were mains of from 24″ to 48″ diameter. The following large mains were completed:

48″ in Palmer Blvd. from Dequindre to Trumbull.

42″ in Dequindre from Holbrook to Palmer Blvd.

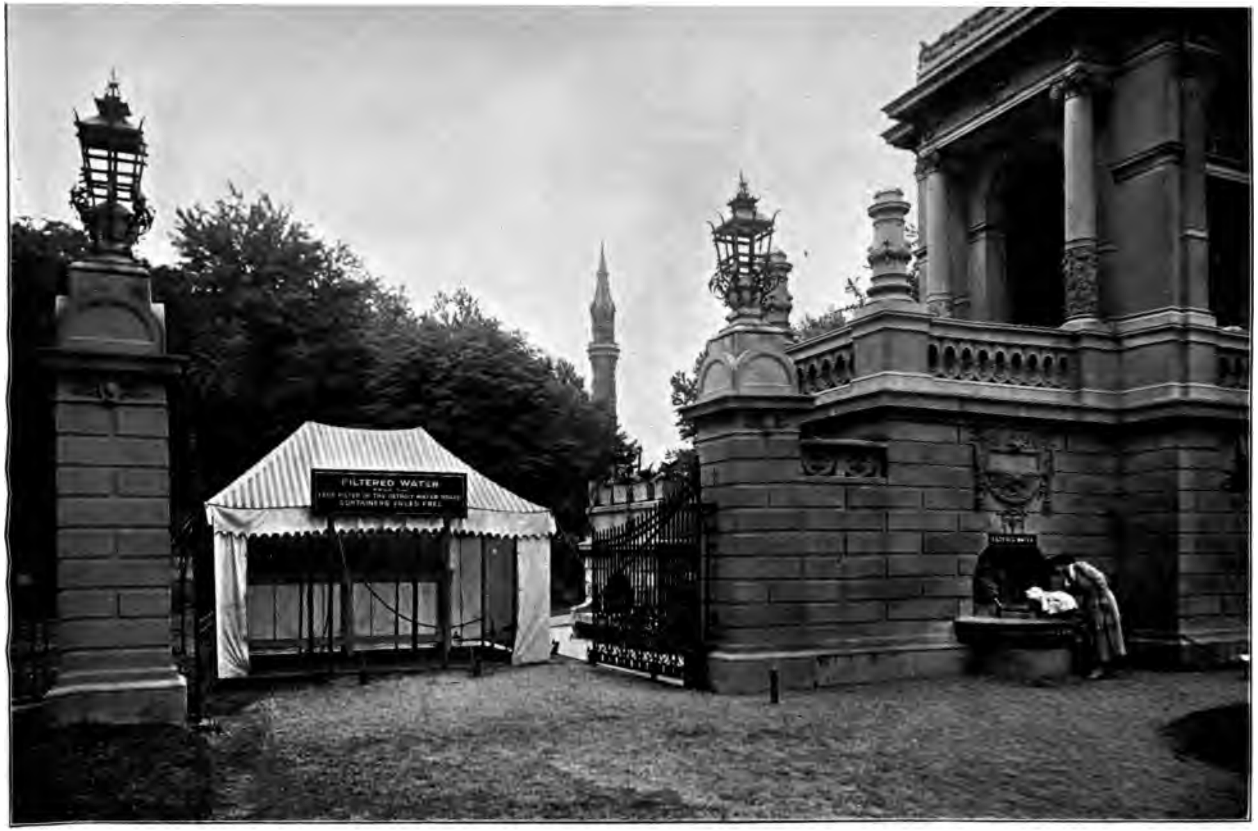
42″ in Linwood and Trumbull from Ford Highway to Palmer Blvd.

24″ in Joy Road and Clairmont from 12th St. to Grand River.

16″ in Dexter Blvd. from Joy Road to Ford Highway.

The 36″ in 12th St. and Ford Highway from North Grand Blvd. to Linwood has also been completed.

Details of the cost of construction and the amount of pipe in the system are given in the accompanying tables:



FILTERED WATER EXHIBIT
Jefferson Ave., at Water Works Park.

DISTRIBUTION SYSTEM

Total Amount of Pipe Laid and Discontinued in the Districts Named during the Year Ending June 30, 1918

	Detroit		Hamtramck	St. Clair Heights	Grosse Pt. Parks	Oakwood	Ecorse		
	Feet Laid	Feet Disc.	Feet Laid	Feet Laid	Feet Laid	Feet Laid	Feet Laid	Total Feet Laid	Total Feet Disc.
2									
3		980							980
4		1,684							1,684
6	301,193		3,885	4,026	7,272	45,317	21,667	383,360	
8	171,829		1,812					173,641	
10	1,318							1,318	
12	37,116							37,116	
16	9,439				584			10,023	
24	23,418							23,418	
36	15,188							15,188	
42	19,679							19,679	
48	12,378							12,378	
	591,558	2,664	5,697	4,026	7,856	45,317	21,667	676,121	2,664

Amount in Miles	128.
Discontinued in Miles	.50
Net Gain	127.50

Note:—Does not include pipe acquired by annexation.

TOTAL PIPE IN SYSTEM JUNE 30, 1918

Size	DETROIT		Grosse Pointe Parks	St. Clair Heights	Hamtramck	River Rouge	Ecorse	Oakwood	Outside City		Entire System	
	Total	%	Total	Total	Total	Total	Total	Total	Total	%	Total	%
2"	6,304	0.1	....	....	....	....	....	....	....	....	6,304	0.1
3"	48,003	0.9	....	....	....	....	....	....	....	....	48,003	0.7
4"	782,713	13.7	....	....	20,748	10,987	1,943	....	33,678	5.8	816,391	13.0
6"	2,558,661	44.9	36,445	51,929	172,420	47,374	55,846	64,295	428,309	72.8	2,986,970	47.5
8"	1,123,711	19.7	18,648	17,573	47,153	9,426	12,471	4,032	109,303	18.5	1,233,014	19.7
10"	247,091	4.3	....	49	3,476	....	....	....	3,525	0.6	250,616	4.0
12"	262,152	4.6	....	5,189	351	402	....	2,180	8,122	1.4	270,274	4.3
16"	119,607	2.1	....	....	....	4,298	....	220	4,518	0.8	124,125	1.9
18"	87	....	....	....	....	....	....	....	....	....	87	....
20"	393	....	....	....	....	....	....	....	....	....	393	....
24"	141,335	2.5						626	626	0.1	141,961	2.3
30"	54,651	1.0	....	....	....	....	....	....	....	....	54,651	0.9
36"	32,206	0.6	....	....	....	....	....	....	....	....	32,206	0.5
42"	164,076	2.9	....	....	....	....	....	....	....	....	164,076	2.6
45"	103	....	....	....	....	....	....	....	....	....	103	....
48"	154,262	2.7	....	....	....	....	....	....	....	....	154,262	2.5
Feet	5,695,355	10.0	55,093	74,740	244,148	72,487	70,260	71,353	588,081	100.0	6,283,436	100.0
Miles	1,078,666	....	10,434	14,155	46,240	13,728	13,307	13,514	111,378	....	1,190,044	....

Note:—All pipe acquired by annexation included.

COST PER FOOT OF WATER MAINS

Size	No. of Feet	Material, Etc.	Labor	Overhead Expense	Total
6″	310,864	.85	.46	.19	1.50
8″	173,641	1.08	.52	.20	1.75
10″	1,318	1.22	.72	.28	2.22
12″	37,116	1.83	.75	.28	2.86
16″	10,023	2.85	.99	.37	4.21
24″	23,418	5.35	3.15	1.19	9.69
36″	15,188	9.77	3.86	1.46	15.09
42″	19,679	13.48	3.62	1.39	18.49
48″	12,378	17.18	3.50	1.33	22.01

BREAKS IN MAINS

There were 81 breaks in water mains during the year, but only four of these were in mains of sufficient size to cause any serious interruption of traffic or reduction of pressure.

Size	Location	Year Laid	Date and Time of Break
48″	Burns and Forest	1912	10:55 A. M. December 17, 1917
42″	Burns and Jefferson	1875	4:10 P. M. January 16, 1918
42″	McDougall & Congress	1875	7:20 P. M. January 28, 1918
42″	Sheridan & Jefferson	1875	1:20 P. M. February 24, 1918

The distribution of breaks throughout the year was as follows:

July	3	January	6
August	0	February	19
September	0	March	28
October	4	April	10
November	1	May	6
December	2	June	2
		Total	81

STORAGE YARD

The following tables show the nature, extent and cost of the work done in the storage yard and of the work done on the maintenance of the distribution system by the Yard employees.

Division of Storage Yard Labor, Year Ending June 30, 1918

Loading, unloading, storing and checking materials	$18,623.60
Cleaning, trimming and plugging salvaged pipe and special castings	7.02
Watching and care of yards, building and equipment	15,871.23
Caring for stables, wagons and harness	3,524.88
Night, Sunday and holiday emergency crews	15,657.62

Repairing and maintaining motor vehicles and other gasoline driven equipment	9,508.59
Repairing wagons and harness	13.37
Horseshoeing	336.74
Repairing and maintaining tools and equipment	15,341.58
Superintendence and clerical work	23,022.07
Special jobs	2,452.99
	$104,359.69

General Work, Year Ending June 30th, 1918

	Material	Labor	Total
Tapping mains and making 3,732 ⅝-in., 895 ¾-in., 694 1-in., 57 1½-in., 65 2-in., 45 3-in., 19 4-in., 20 6-in., 9 8-in. and 2 10-in. service connections and discontinuing 120 ⅝-in., 14 ¾-in. and 17 1-in.	$10,798.94	$ 6,275.58	$ 17,074.52
Examining, repairing and maintaining gates and wells	7,945.19	3,448.20	11,393.39
Repairing leaks and breaks in mains (233)	4,759.39	8,454.66	13,214.05
Attending to leaks on service connections (1,628)	2,517.84	6,350.99	8,868.83
Responding to false reports of leaks (315)	309.36	140.11	449.47
Opening blow-offs to flush dead ends	492.65	2,909.84	3,402.49
Shutting service connections on account of leaks, nonpayment and letting on same	236.45	916.90	1,153.35
Examining fire plants, air chambers, hydraulic elevators, river connections, setting pressure gauges and reading pressures	173.12	392.72	565.84
Curing No Water and Short Supply complaints	393.67	1,235.27	1,628.94
Repairing sunken trenches and damaged walks and lawns	240.56	435.96	676.52
Caring for drinking fountains	535.10	1,468.39	2,003.49
Maintenance of main office building and equipment	43.28	652.39	695.67
Maintenance of buildings, fences and equipment	140.30	....	140.30
Yard cartage and expressing to stores	3,056.44	6,191.68	9,248.12
Yard supplies and expenses	1.08	....	1.08
Repair and maintenance of tools and equipment	326.21	....	326.21
Repair and maintain automobiles	1.83	....	1.83
Guard expense, Water Works Park	376.07	....	376.07
Horse expense, Water Works Park	44.46	....	44.46
Horseshoeing	3.01	....	3.01
Emergency service	11.34	....	11.34
Maintenance of steam power plant	568.75	....	568.75
Storage yard plant and equipment	5.31	....	5.31
Maintenance of purification plant	8.59	....	8.59
Wages of fireman and helpers	....	59.43	59.43
Emergency Station (watchman)	....	70.08	70.08
Setting 6-in. meters—Billed Village of Hamtramck	1,834.17	910.74	2,744.91
Alley S. of Clinton, E. of Beaubien, killing 4-in. main	4.19	25.58	29.77
Ashland, N. of Jefferson, lowering 6-in. main	17.81	368.86	386.67
Lynch Road munition plant, laid 1,025 ft. of 6-in pipe—Billed Dodge Bros.	2,277.07	561.20	2,838.27
Palmer Ave., 42-in. main; additional charges for repaving per Dept. Public Works bills	6,372.74	....	6.372.74
Setting 50 fire hydrants in village—Billed Village of St. Clair Heights	7,456.00	5,871.98	13,327.98
Jefferson Ave., 48-in. main. Additional charges for repaving per Dept. Public Works bills; also additional charges for material and labor not included when job was closed	33,109.69	6,591.03	39,700.72
	$84,060.61	$53,331.59	$137,392.20

SERVICES AND METERS

During the year, 5558 new services of all sizes were installed and 151 old ones were removed, making a gain of 5407 and a total of 149,120 service connections in the system.

Size	Installed	Removed	Net Increase	Total in System
⅝″	3752	120	3632	102,284
¾″	895	14	881	5,706
1″	694	17	677	37,693
1½″	57		57	187
2″	65		65	1,584
3″	45		45	897
4″	19		19	487
6″	20		20	247
8″	9		9	29
10″	2		2	5
12″	0		0	1
Total	5,558	151	5,407	149,120

The installation of meters has been continued as rapidly as possible, and there has been an increase of 29,087 over those in service on June 30, 1917. Further details of sizes and kinds of meters in service and cost of meter testing are given in the following tables:

Number of Meters Set Year Ending June 30, 1918

	⅝″	¾″	1″	1½″	2″	3″	4″	6″	8″	10″	16″	Ind.	Total
In Service July 1, 1917	41,547	17,155	4,392	895	836	338	236	108	7	1	1	26	65,542
Set during year ending June 30, 1918......	28,847	6,159	1,248	115	98	41	24	22	1	..	..	..	36,555
	70,394	23,314	5,640	1,010	934	379	260	130	8	1	1	26	102,097
Removed during year ending June 30, 1918	5,328	2,024	617	9	15	5	3	3	..	..	..	1	8,005
Net Gain	23,519	4,135	631	106	83	36	21	19	..	..	..	1	28,549
Acquired by annexation	482	32	11	2	7	1	2	1	..	..	..	..	538
Total in service July 1, 1918	65,548	21,322	5,034	1,003	926	375	259	128	8	1	1	25	94,630

Kind of Meters In Service Year Ending June 30, 1918

	⅝″	¾″	1″	1½″	2″	3″	4″	6″	8″	10″	16″	Ind.	Total
Buffalo American.....	32	9	7	6	2								56
Desper Indicator.....												25	25
Gamon Watch Dog*..	1,802	192	80	220	238								2,532
Gamon Watch Dog**.	44,995	10,408	459										55,862
Gamon Watch Dog Current							12	24					36
Hersey D	11	3		12	14	5	7	1					53
Hersey Detector......						1	8	19	6	1			35
Hersey F	11	5	2	1									19
Hersey Rotary			3	2									5
Hersey Torrent						5	3	3					11
National Nash	8,124	6,068	945	141	67	27	14						15,336
National Crown			3										3
Neptune			1										1
Neptune Crest Trident											1		1
Neptune Trident	294	12	8	2	4								320
Neptune Empire Compound							1						1
Pittsburgh Eureka ...							1	1					2
Pittsburgh Keystone..	28	7	5	3	2		2						47

	⅝"	¾"	1"	1½"	2"	3"	4"	6"	8"	10"	16"	Ind	Total
Thomson	4,281	1,465	2,515	486	464	260	135	40	..	..	..	..	9,646
Union King	30	9	3	2	3	...	...	...	..	..	..	..	47
Union Nilo	.....	.....	....	....	1	...	1	...	..	..	..	..	2
Worthington	5,940	3,144	1,003	128	130	76	75	40	..	..	..	..	10,536
Worthington Piston ..	.....	.....	....	....	1	1	...	...	..	..	..	..	2
Worthington Turbine..	.....	.....	....	....	...	...	...	...	2	..	..	..	2
	65,548	21,322	5,034	1,003	926	375	259	128	8	1	1	25	94,630

*235 Revolutions.
**300 Revolutions.

Cost of Installing Meters Year Ending June 30, 1918

Size	Number	Labor and Cartage	Material	Total	Average Labor and Cartage	Average Labor and Material	Average Cost
⅝"	23,519	$9,407.60	$157,577.30	$166,984.90	$0.40	$6.70	$7.10
¾"	4,135	1,654.00	38.869.00	40,523.00	.40	9.40	9.80
1"	631	262.40	7,518.50	7,780.90	.40	13.50	13.90
1½"	106	175.96	2,798.40	2,974.36	1.66	26.40	28.06
2"	83	137.78	3,029.50	3,167.28	1.66	36.50	38.16
*3"	36						
*4"	21						
*6"	19						
**8"	1						
		$11,637.74	$209,792.70	$221,430.44			

*Set by consumer.
**Set and supplied by consumer.

Cost of Meter Testing Year Ending June 30, 1918

Sizes	Number	Flows	Cost	Average
⅝"	25647	Full to ⅛"	$1,795.29	.07
¾"	6889	Full to ⅛"	688.90	.10
1"	1254	Full to ⅛"	175.56	.14
1½"	232	Full to ⅛"	197.20	.85
2"	153	Full to ⅛"	130.05	.85
3"	66	Full to ⅛"	253.66	3.84
4"	27	Full to ⅛"	103.68	3.84
6"	25	Full to ⅛"	96.00	3.84
8"	1	Full to ⅛"	3.84	3.84
	34294		3444.18	

Cost of Repairing Meters Year Ending June 30, 1918

Damaged by Hot Water

Sizes	Number	Labor	Material	Total	Average Labor	Average Material	Average Cost
⅝"	821	$1,135.27	$ 140.76	$1,276.03	$ 1.38	$ .17	$ 1.55
¾"	678	1,000.51	165.88	1,166.39	1.48	.24	1.72
1"	193	75.19	13.84	89.03	.39	.07	.46
1½"	19	75.12	$ 27.13	$ 102.25	3.95	1.43	5.38
2"	9	43.36	9.90	53.16	4.81	1.10	5.91
3"	3	22.61	16.39	39.00	7.54	5.46	13.00
Total	1723	$2,351.96	$ 373.90	$2,725.86			

Damaged by Frost

Sizes	Number	Labor	Material	Total	Average Labor	Average Material	Average Cost
⅝"	3083	$4,097.87	$1,088.42	$5,186.29	$ 1.33	$ .35	$ 1.68
¾"	901	1,294.71	284.80	1,579.51	1.44	.31	1.75
1"	80	150.62	87.70	238.32	1.88	1.10	2.98
1½"	14	65.55	31.73	97.28	4.68	2.27	6.95
2"	5	28.36	38.37	66.73	5.67	7.67	13.34
3"	5	39.39	102.18	141.57	7.88	20.44	28.32
	4088	$5,676.50	$1,633.20	$7,309.70			

Because of Wear and Tear

Sizes	Number	Labor	Material	Total	Average Labor	Average Material	Average Cost
⅝"	2519	$3,580.57	$ 678.32	$4,258.89	$ 1.42	$ .27	$ 1.69
¾"	754	1,164.01	257.04	1,421.05	1.54	.34	1.88
1"	274	526.81	172.77	699.58	1.92	.63	2.55
1½"	51	182.27	73.05	255.32	3.57	1.43	5.00
2"	60	260.88	124.18	385.06	4.35	2.07	6.42
3"	22	108.52	53.30	161.82	4.93	2.42	7.35
4"	26	105.28	58.50	163.78	4.05	2.25	6.30
6"	11	34.74	130.34	165.08	3.16	11.85	15.01
	3717	$5,963.08	$1,547.50	$7,510.58			

WATER WORKS PARK AND PUMPING STATIONS

Owing to shortage of labor and to the fact that a large part of the grounds are closed to the public during the war, but little work of improvement has been undertaken. The lagoons in the west side of the park are being gradually filled in and a concrete walk was built from the Hurlbut Gate to the Station and Library.

The hoisting machinery has been installed in the screen-houses; the 8 foot tunnel to the New Station completed and the water turned on. A new derrick for unloading coal was erected in May and the D. U. R. spur was extended to it so that coal may be received either by rail or by water.

In the new station a three ton auxiliary hoist was added to the traveling crane and work was started on a 10-inch steam main from the boiler house to the new engines, but owing to delays in receiving steel fittings, the work is progressing very slowly.

Fire, which broke out in the middle coal shed on December 26th, required several days of hard labor to subdue, and resulted in the loss of about 25 tons of coal.

On February 5th, low water in the river rendered it necessary to open the emergency intake for a period of 18 hours.

Respectfully submitted,

H. B. KEENEY,
Assistant General Superintendent.

SUMMARY OF STATISTICS

In form recommended by the New England Water Works Association

---

Detroit Water Works,
Detroit, Wayne County, Michigan.

GENERAL STATISTICS

Population by United States Census of 1910, 465,766.
Date of construction, 1827.
By whom owned. The Board of Water Commissioners of the City of Detroit.
Source of supply: Detroit River, near Lake St. Clair.
Mode of supply, pumping.

PUMPING STATISTICS

Builders of pumping machinery—

- One 24,000,000 gallon, Compound Beam, Detroit Locomotive Works, Detroit, Michigan.
- One 24,000,000 gallon, Compound Beam, Riverside Engine Works, Detroit, Michigan.
- One 30,000,000 gallon, Compound Beam, Riverside Engine Works, Detroit, Michgan.
- One 24,000,000 gallon, Triple Expansion, E. P. Allis & Co., Milwaukee, Wis.
- Two 25,000,000 gallon, Triple Expansion, Allis Chalmers Co., Milwaukee. Wis.
- One 25,000,000 gallon, Triple Expansion, Holly Mfg. Co., Buffalo, N. Y.
- Three 30,000,000 gallon, Triple Expansion, Bethlehem Steel Co., South Bethlehem, Pa.

Description of fuel used—

a. Kind, bituminous, run of mine.
b. Brand of coal.
c. Average price of coal, per gross ton (2,240 lbs.) delivered at Water Works .... **$ 6.09**
d. Percentage of ash, from Laboratory Analyses.......... **10.6%**
e. Wood, price per cord, none used.

Coal consumed for the year, 57,923,880.
Amount of other fuel used, none.

Total pumping for the year:

High Service	14,194,030,000 gallons
Low Service	37,191,363,320 gallons
Total	52,816,963,375 gallons

An allowance of 3.7% slip of all engines has been made in these quantities, and they represent the actual metered consumption.

Average static head against which pumps work—

Number of gallons pumped per pound of equivalent coal, 912.

Duty=Gallons pumped x 8.34 (lbs.) x 100 x dynamic head=89,507,267
Total Fuel Consumed.

Cost of pumping, figured on pumping station expenses, $270,518.05.

Per million gallons pumped, $5.12.

Per million raised one foot (dynamic), $.0435.

STATISTICS OF CONSUMPTION OF WATER

Estimated total population at date (City of Detroit)	900,100
Estimated population on lines of pipe	950,000
Estimated population supplied	950,000
Total consumption for the year	52,816,963,375 gallons
Passed through meters	28,978,686,900 gallons
Percentage of consumption metered	54.9%
Average daily consumption	144,704,009 gallons
Gallons per day to each inhabitant	152.3
Gallons per day to each consumer	152.3
Gallons per day to each tap	970
Cost of supplying water per million gallons figured on total maintenance	$11.33
Total cost of supplying water per million gallons figured on total maintenance plus interest on bonds	$12.84

STATISTICS RELATING TO DISTRIBUTION SYSTEM

Mains

Kind of pipe, cast iron.

Sizes, from 2-inch to 48-inch.

Extended during year	734,028 feet	139.02 miles
Discontinued during year	2,664 feet	0.50 miles
Total now in use	6,283,436 feet	1,190.04 miles
Cost of repairs per mile		$11.10

Number of leaks per mile	0.196
Lengths of pipe less than 4-inches diameter	10.29
Number of hydrants (public) added during the year	276
Number of hydrants (public) now in use	7696 and 225 H. P.
Number of cisterns now in use	516
Capacity of cisterns	3,772,000 gallons
Number of stop-gates added during the year	1006
Number of stop-gates now in use	12,525
Number of blow-offs	1,048
Number of stop-gates smaller than 4-inch	26

Range of pressure on main, 15 lbs. to 65 lbs.

SERVICES

Kind of pipe, lead and cast iron.

Sizes, ⅝ inch to 12-inch.

Net number of service taps added during year	5,387
Number now in use	151,439

Average length of service, approximately 30 feet.

Number of meters added	29,087
Number of meters now in use	94,630
Percentage of services metered	62.5
Percentage of receipts from metered water	76.8%

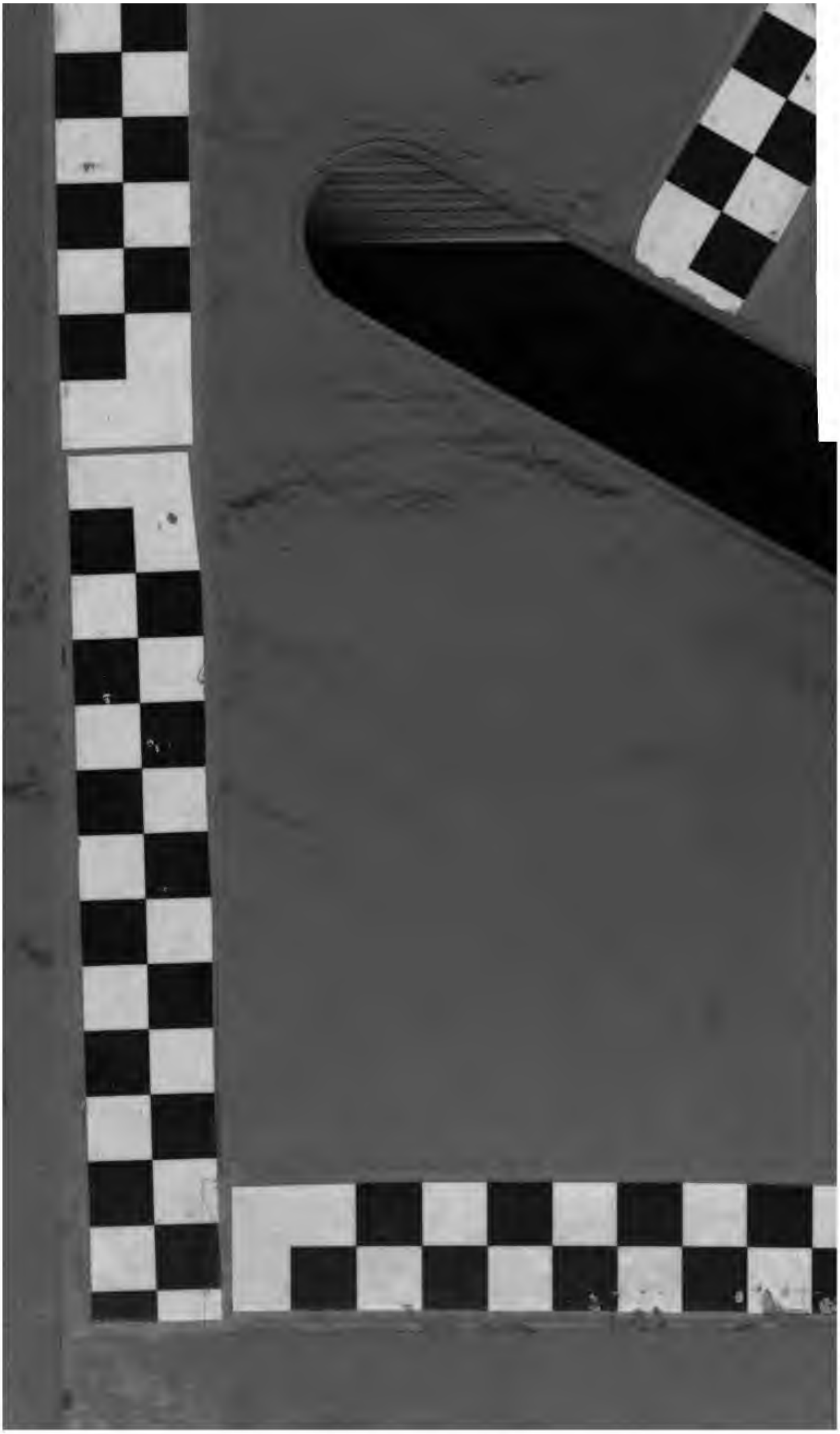
ROLL OF COMMISSIONERS AND THEIR TENURE OF OFFICE

James A. Van Dyke	1853	1855	Died.
Edmund A. Brush	1853	1868	Resigned.
Henry Ledyard	1853	1859	Resigned.
Shubael Conant	1853	1859	May 1st.
William R. Noyes	1853	1865	Resigned.
Alexander D. Frazer	1855	1871	May 1st.
Julius D. Morton	1859	1865	Died.
John V. Ruehle	1859	1861	Resigned.
Chauncy Hurlbut	1861—1863	1868—1885	Died.
Stanley G. Wight	1863	1868	May 1st.
Jacob S. Farrand	1865	1890	May 1st.
John Owen	1865	1879	May 1st.
Caleb Van Husan	1868	1872	May 1st.
Samuel F. Hodge	1871	1879	Resigned.
Elijah Smith	1872	1877	May 1st.
Michael Martz	1877	1887	May 1st.
James Beatty	1879	1885	Died.
John Pridgeon	1879—1884	1886—1891	May 1st.
Marshall H. Godfrey	1884	1889	Resigned.
Edwin F. Conley	1885	1886	May 1st.
Samuel G. Caskey	1885	1895	May 1st.
Joseph Nagel	1887	1890	Died.
August Goebel	1889—1894	1897—1898	Resigned.
Henry M. Duffield	1890	1895	May 1st.
Joseph L. Hudson	1890	1894	May 1st.
Frank E. Kirby	1891	1896	May 1st.
Albert L. Stephens	1894	1897	May 1st.
D. W. H. Moreland	1894	1896	Resigned.
Clarence A. Black	1894	1894	Resigned.
Edward W. Pendleton	1894	1909	May 1st.
Darius D. Thorp	1895	1905	May 1st.
John P. Huckestein	1896	1897	Resigned.

John W. McGrath	1896	1901	May 1st.
Joseph J. Noeker	1898	1902	May 1st.
James W. Millen	1897	1898	May 1st.
James Meathe	1898	1899	Died.
Benjamin Guiney	1899	1900	Resigned.
John Zynda	1900	1908	May 1st.
Joseph J. Crowley	1901	1906	May 1st.
John Shroeder	1902	1907	May 1st.
John F. Dodge	1905	1910	May 1st.
Frederick J. Clippert	1906	1911	May 1st.
James H. Pound	1907	1912	Resigned.
Basil A. Lemke	1908	1913	May 1st.
James Wilkie	1909	1914	May 1st.
John Gillespie	1910	1913	Resigned.
George Lane	1911	1916	May 1st.
James J. Brady	1912	1917	May 1st.
Thomas F. Comerford	1913	1914	Resigned.
Emil Stroh	1914	1917	Resigned.

MEMBERS OF THE BOARD, 1917-1918

BENJ. F. GUINEY, 1914
ALEX. DOW, 1916
ALBERT P. TERNES, 1917
JOHN B. SOSNOWSKI, 1917
ROBERT OAKMAN, 1914



IXTY-EIGHTH
UAL REPORT
Board *of* Water
nissioners *of*
ity *of* Detroit

he Year Ending
ne 30th, 1920

Department of Water Supply

SIXTY-EIGHTH ANNUAL REPORT

OF THE

BOARD OF WATER COMMISSIONERS

OF THE CITY OF DETROIT

TO THE

COMMON COUNCIL of THE CITY of DETROIT

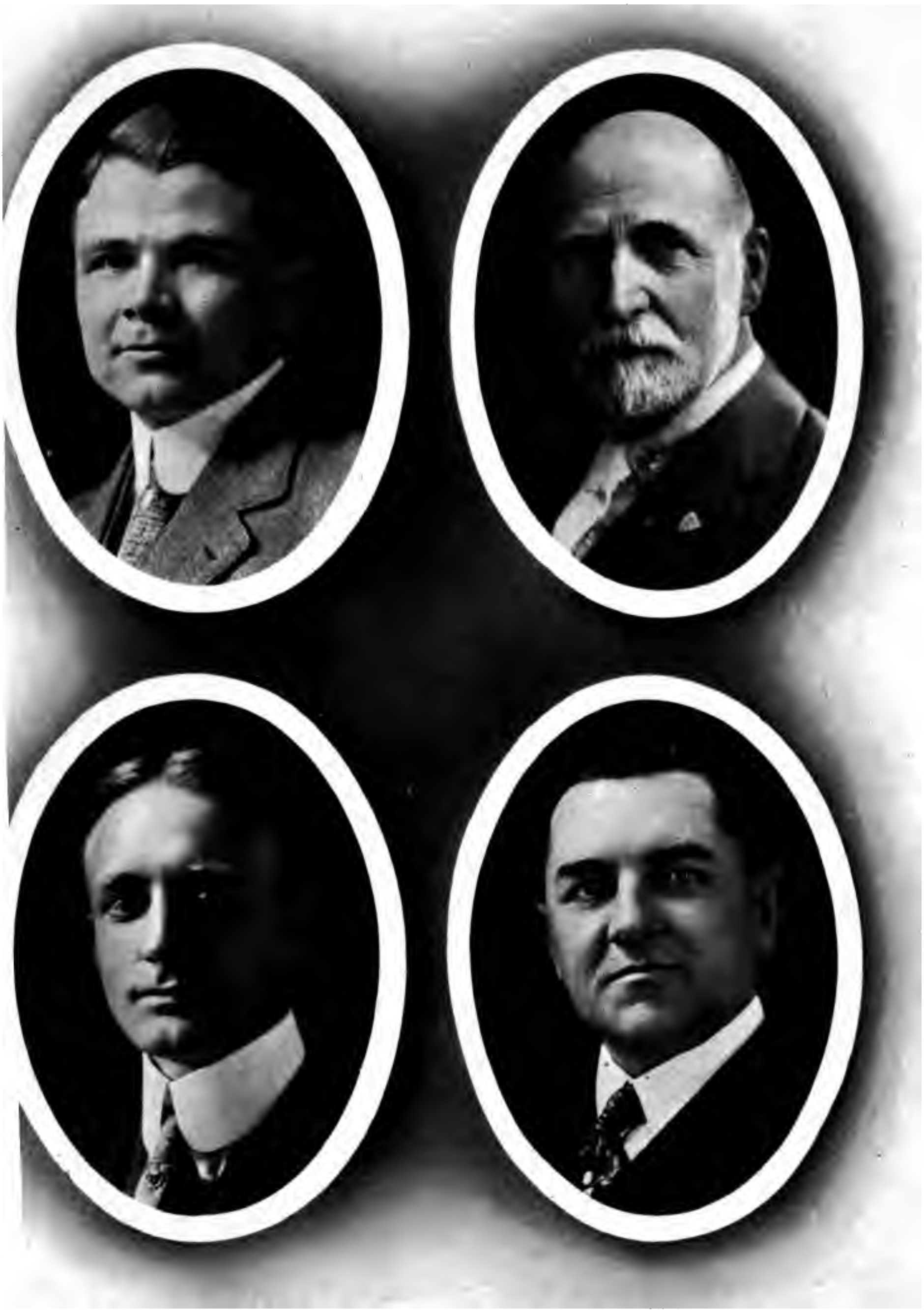
TOGETHER WITH THE REPORTS OF
THE OFFICERS OF THE BOARD

FOR THE YEAR ENDING
JUNE 30, 1920

GEORGE H. FENKELL
SUPT. AND GENERAL MANAGER

HARRY S. STARKEY
CRETARY AND OFFICE SUPERINTENDENT

THEODORE A. LEISEN
CIVIL ENGINEER



JOHN B. SOSNOWSKI
PRESIDENT
MAN COMMITTEE EXTENSION AND CONSTRUCTION

FRANCIS L. SWARD
CHAIRMAN COMMITTEE WAYS AND MEANS

ALEX. DOW
VICE-PRESIDENT
CHAIRMAN COMMITTEE PUMPING STATION

ALBERT P. TERNES
CHAIRMAN COMMITTEE ON SUPPLIES

Department of Water Supply

BOARD OF WATER COMMISSIONERS OF THE CITY OF DETROIT

MEMBERS

ALBERT P. TERNES	ALEX. DOW
JOHN B. SOSNOWSKI	FRANCIS L. SWARD

COMMITTEES

Ways and Means	Commissioners SWARD and TERNES
Extension and Construction	Commissioners SOSNOWSKI and DOW
Water Works Park	Commissioners DOW and SOSNOWSKI
Supplies	Commissioners TERNES and SWARD

The President is ex-officio member of each committee.

OFFICERS

President	ALBERT P TERNES
Vice-President	JOHN B. SOSNOWSKI
Secretary and Office Superintendent	HARRY S. STARKEY
Superintendent and General Manager	GEORGE H. FENKELL
Civil Engineer	THEODORE A. LEISEN
Assistant Superintendent	W. M. MITCHELL
Auditor	J. W. LOEFFLER
Superintendent of Pumping Station	HARRY. W. GOULD
Accountant	CHAS. M. SHIELDS
Cashier	D. C. GROBBEL
Permit Clerk	LOUIS MONTGOMERY
Chief Clerk, Rate Department	WALTER C. BROWN
Chief Clerk, Meter Department	JAMES B. WORTON

METER RATES

First 1,000 cu. ft., per quarter, $1.00 (minimum charge).
Next 3,000 cu. ft., per quarter, 50c per 1,000 cu. ft.
All additional, 35c per 1,000 cu. ft.

ANNUAL REPORT
THE BOARD OF WATER COMMISSIONERS
OF THE CITY OF DETROIT

July 1, 1919, to June 30, 1920

TO THE HONORABLE

The Common Council of the City of Detroit.

Gentlemen:—

The Board of Water Commissioners of the City of Detroit respectfully presents its annual report for the fiscal year ending June 30, 1920.

The total revenues from the sale of water was $2,537,952.59, and the total disbursements for water service operation were $1,159,332.21. The total pumpage for the year was 55,631,262,500 gallons, an increase of 12.4% over that of the previous year. The average daily consumption of water was 151,997,985 gallons, equal to a daily per capita consumption of 142.6 gallons, based on a population of 1,066,240.

During the year 109 miles of new water mains were completed. The work of metering all service connections has been going forward steadily during the year, and on June 30, 1920, there were 141,278 meters in service.

Preparation of the plans and specifications for a filter plant of a capacity sufficient to supply the entire city with pure water is nearing completion and bids for construction will shortly be called for.

Respectfully submitted,

ALBERT P. TERNES,
JOHN B. SOSNOWSKI,
ALEX DOW,
FRANCIS L. SWARD,
Commissioners.

BOARD OF WATER COMMISSIONERS
CITY OF DETROIT

CASH STATEMENT

June 30, 1919		
Cash on hand	$ 29,393.37	
Cash received year ending June 30, 1920	2,793,767.70	
Total		$2,823,161.07
June 30, 1920		
Deposited to credit of City Treasurer year ending June 30, 1920		2,819,156.07
Cash on hand		
Cashier's fund	$ 3,000.00	
Secretary's fund	1,005.00	
		4,005.00

BOARD OF WATER COMMISSIONERS
CITY OF DETROIT

OPERATING STATEMENT
RECEIPTS

Water Service Operating Revenues:			
Assessment Rates	$ 86,537.77		
Meter Rates	2,424,477.84		
Percentage, shutting-off, let-on, etc	26,936.98		
Total Revenue from Water Service Operation		$2,537,952.59	
Cost of Water Service Operations		1,159,332.21	
Net Gain from Water Service Operations			$1,378,620.38
Miscellaneous Revenues:			
Bonus for Pipe Line laid on Petition	$ 187,574.26		
Meter Bonus	13,087.20		
Sales Miscellaneous Work and Material	9,076.75		
Plumber's License	1,310.50		
Suburban Inspection	2,171.00		
Income from Hurlbut Fund	4,792.45		
Total Miscellaneous Revenue			218,012.16
Total Revenues			$1,596,632.54
Non-Operating Costs:			
Water Works Park Expense	$ 43,166.48		
Interest on Loans	708.32		
Interest on Bonds	137,657.39		
Auditing Expense	1,500.00		
Fire Loss	20,958.25		
House Renumbering	1,845.00		
Pitometer Survey	53,667.09		
Total			259,502.53
Net Gain Year Ending June 30, 1920			$1,337,130.01
To Detroit City Sinking Fund to provide for retirement of bonds			204,830.11
To Surplus			$1,132,299.90

BOARD OF WATER COMMISSIONERS
CITY OF DETROIT

COST OF WATER SERVICE OPERATIONS FOR YEAR ENDING JUNE 30, 1920.
Pumped Per Meter at Pumping Station—55,631,262,500 Gals.

PRODUCTION COST	1920 Costs		Cost per Million Gallons
Collection and Purification Costs:			
Operation of Filtration and Intake System	$ 3,014.21		
Chemical Treatment	13,918.91		
Maintenance, Collection and Purification Plant	5,785.55		
Deferred Maintenance	9,672.58		
Miscellaneous Supplies and Expense	290.71		
Direct Cost of Collection and Purification		32,681.96	$ 0.59
Steam Power Costs:			
Fuel for Pumping	$209,672.27		
Wages of Firemen and Helpers	85,709.45		
Boiler House Supplies and Expense	518.59		
Maintenance Steam Power Plant and Buildings	9,928.17		
Deferred Maintenance	7,427.06		
Direct Steam Power Costs		313,255.54	5.63
Cost of Operating Pumps:			
Wages of Assistant Engineers and Helpers	$ 71,116.38		
Oils, Waste and Supplies	5,883.50		
Maintenance of Pumping Plant and Buildings	6,336.60		
Deferred Maintenance	29,531.55		
Direct Cost of Operating Pumps		112,868.03	2.03
Superintendence and General Expense	$ 8,016.53		
		8,016.53	.15
Proportion of Overhead Expense:			
Proportion of Engineering Department Expense	$ 4,959.98		
Proportion of Administration and General Expense	2,993.63		
Total Proportion of Overhead Expense		7,953.61	.14
Total Cost of Water Delivered to Mains		$ 474,775.67	$ 8.54

DISTRIBUTION COST

Distribution System Cost:			
Repairing Main Leaks	$ 32,382.12		
Repair and Maintain Gates and Wells	85,392.63		
Flush Mains and Blow Off Dead Ends	3,666.11		
Repair Trenches, Walks and Lawns	5,033.82		
Depreciation of Pipe Lines	173,036.54		
Deferred Maintenance of Emergency Station	210.51		
Direct Distribution Cost		$ 279,721.73	$ 5.03
Operation and Maintenance Service Connections:			
Repair Service Leaks	$ 12,969.56		
Repair and Maintain Drinking Fountains	7,152.27		
False Report of Leaks	1,026.89		
No Water and Short Supply	1,721.31		
Shut-off and Let-on	1,458.81		
Miscellaneous Inspection	11,306.56		
Direct Service Cost		35,635.40	.64
Proportion of Overhead Expense:			
Proportion of Storage Yard Expense	$ 2,074.08		
Proportion of Engineering Department Expense	9,868.91		
Proportion of Administration and General Expense	17,854.49		
Total Proportion of Overhead Expense		29,397.48	.53
Total Distribution Cost		$ 344,754.61	$ 6.20

METER SERVICE COST

Meter Department Costs:			
Repair and Maintain Meters	$ 20,978.05		
Remove and Replace Meters	12,821.01		
Depreciation of Meters	30,823.25		
Direct Meter Cost		$ 64,622.31	$ 1.16
Proportion of Overhead Expense:			
Proportion of Storage Yard Expense	$ 76,300.99		
Proportion of Administration and General Expense	198,878.63		
Total Proportion of Overhead Expense		275,179.62	4.94
Total Meter Service Cost		$ 339,801.93	$ 6.10

SUMMARY

Total Cost of Water Delivered to Mains	$ 474,775.67	$ 8.54
Total Distribution Cost	344,754.61	6.20
Total Cost of Water Pumped and Delivered	819,530.28	14.74
Total Meter Cost	339,801.93	6.10
TOTAL	$1,159,332.21	$20.84

CONSTRUCTION OF MAINS IN PROGRESS JUNE 30, 1920.

June 30, 1919	Construction of Mains in Progress		$ 567,646.61
	Direct Charges:		
June 30, 1920	Pay Rolls	$ 599,108.81	
	Material	1,758,238.94	
	Cartage	16,231.50	
	Total Direct Charges		2,373,579.25
	Overhead Expense:		
	Storage Yard Expense	$ 126,507.00	
	Engineering Department Expense	41,566.58	
	Administration and General Expense	12,650.70	
	Total Overhead		180,724.28
	Total		$3,121,950.14
	Completed Work transferred to Water Mains, Gates and Wells		1,849,786.59
June 30, 1920	Construction of Mains in Progress		$1,272,163.55

PLANT CONSTRUCTION IN PROGRESS JUNE 30, 1920.

June 30, 1919	Filtration Plant in Progress	$ 15,705.77		
June 30, 1920	Outlay	31,304.54		
				$ 47,010.31
June 30, 1919	Booster Station in Progress	$ 15,000.00		
June 30, 1920	Outlay	56,251.80		
				71,251.80
June 30, 1919	No. 1 Plant in Progress	$ 61,970.57		
June 30, 1920	Outlay	111,206.80		
				173,177.37
June 30, 1919	No. 2 Plant in Progress	$221,991.29		
June 30, 1920	Outlay	39,987.22		
				261,978.51
June 30, 1920	East Yards Buildings and Improvements			3,330.50
June 30, 1920	West Yards Buildings and Improvements			5,931.99
June 30, 1920	Plant Construction in Progress		$562,680.48	
			$562,680.48	$562,680.48

BOARD OF WATER COMMISSIONERS
CITY OF DETROIT

BALANCE SHEET
June 30th, 1920

ASSETS

Cash:		
Cashier's Fund	$ 3,000.00	
Secretary's Fund	1,005.00	
Total Cash		$ 4,005.00
Accounts Receivable:		
Assessed Rates	$ 8,664.99	
Meter Rates	220,966.72	
Miscellaneous	7,249.02	
Pipe Line laid on Petition	57,901.60	
Total Accounts Receivable		294,782.33
Inventories:		
Stores and Supplies at Yards	$ 1,002,827.74	
Coal at Pumping Station	31,372.75	
Equipments	361,597.10	
Construction of Mains in Progress	1,272,163.55	
Plant Construction in Progress	562,680.48	
Special Jobs in Progress	23,677.63	
Total Inventories		3,254,319.25
Plants:		
Collection and Purif. Plant	$ 679,732.16	
Steam Power Plant No. 1	271,456.89	
Pumping Plant No. 1	1,055,757.73	
Pumping Plant No. 2	1,022,984.68	
Water Mains, Gates and Wells	17,303,654.03	
Meters in Service	1,266,503.57	
Public Drinking Fountains	9,961.72	
Storage Yards, Buildings and Improvements	128,707.72	
Emergency Station	15,788.61	
Main Office Building	70,473.06	
Water Works Park Improvements	199,134.16	
	$22,024,154.33	
Less Reserve for Deprec.	3,126,856.18	
Total Value of Plants		18,897,298.15
Real Estate		909.029.18
Detroit City Sinking Fund		223,993.83
Total		$23,583,427.74

LIABILITIES

Current Liabilities:		
Vouchers Payable	$ 60.957.92	
Accrued Interest on Bonds	33,936.31	
1920-21 Assessments	3,747.56	
Accrued Pay Rolls	15,858.18	
Unclaimed Pay Roll	714.12	
City of Detroit	2,616,660.77	
Notes Payable	4,000.00	
Total Current Liabilities		$ 2,735,874.86
Special Liabilities:		
Liability to Injured Workmen	$ 3,486.92	
Bonded Indebtedness	2,855,114.50	
Total Special Liabilities		2,858,601.32
Surplus		17,764,957.73
Sinking Fund Reserve		223,993.83
		$23,583,427.74

BONDED INDEBTEDNESS

June 30th, 1920

Issued by	Date of Issue	Expire	When Due	Rate of Interest	Amount
City of Detroit	Jan. 10, 1895	30 years	Jan. 10, 1925	4 %	$ 100,000.00
Delray	June 1, 1898	30 years	June 1, 1928	5 %	50,000.00
City of Detroit	Feb. 1, 1900	30 years	Feb. 1, 1930	3½%	180,000.00
Hamtramck	Nov. 15, 1901	30 years	Nov. 15, 1931	4 %	8,914.40
Woodmere	Oct. 18, 1901	30 years	Oct. 18, 1931	3½%	93,000.00
City of Detroit	Jan. 1, 1903	30 years	Jan. 1, 1933	3½%	50,000.00
City of Detroit	Sept. 1, 1903	30 years	Sept. 1, 1933	3½%	150,000.00
City of Detroit	June 1, 1904	30 years	June 1, 1934	3½%	200,000.00
City of Detroit	July 1, 1904	30 years	July 1, 1934	4½%	25,200.00
City of Detroit	Feb. 1, 1905	30 years	Feb. 1, 1935	3½%	150,000.00
Fairview	Sept. 1, 1905	30 years	Sept. 1, 1935	4½%	21,000.00
St. Clair Heights	Oct. 16, 1905	30 years	Oct. 16, 1935	5 %	26,000.00
Fairview	Sept. 1, 1906	30 years	Sept. 1, 1936	4½%	21,000.00
City of Detroit	Aug. 1, 1908	30 years	Aug. 1, 1938	3½%	175,000.00
City of Detroit	July 1, 1909	30 years	July 1, 1939	3½%	102,000.00
St. Clair Heights	Dec. 15, 1911	30 years	Dec. 15, 1941	4½%	12,000.00
City of Detroit	Oct. 1, 1912	30 years	Oct. 1, 1942	4 %	240,000.00
City of Detroit	Mar. 1, 1914	30 years	Mar. 1, 1944	4 %	500,000.00
St. Clair Heights	July 1, 1914	30 years	July 1, 1944	5 %	5,000.00
City of Detroit	April 1, 1915	30 years	April 1, 1945	5 %	6,000.00
City of Detroit	June 1, 1916	30 years	June 1, 1946	5 %	15,000.00
St. Clair Heights	Aug. 1, 1917	30 years	Aug. 1, 1947	4 %	225,000.00
St. Clair Heights	Sept. 1, 1919	1 year	Sept. 1, 1920	4½%	17,000.00
St. Clair Heights	Sept. 1, 1919	2 years	Sept. 1, 1921	4½%	17,000.00
City of Detroit	Sept. 1, 1919	3 years	Sept. 1, 1922	4½%	17,000.00
City of Detroit	Sept. 1, 1919	4 years	Sept. 1, 1923	4½%	17,000.00
City of Detroit	Sept. 1, 1919	5 years	Sept. 1, 1924	4½%	17,000.00
City of Detroit	Sept. 1, 1919	6 years	Sept. 1, 1925	4½%	17,000.00

BONDED INDEBTEDNESS (Continued)

City of Detroit	Sept. 1, 1919	7 years	Sept. 1, 1926	4½%	17,000.00
City of Detroit	Sept. 1, 1919	8 years	Sept. 1, 1927	4½%	17,000.00
City of Detroit	Sept. 1, 1919	9 years	Sept. 1, 1928	4½%	17,000.00
City of Detroit	Sept. 1, 1919	10 years	Sept. 1, 1929	4½%	17,000.00
City of Detroit	Sept. 1, 1919	11 years	Sept. 1, 1930	4½%	17,000.00
City of Detroit	Sept. 1, 1919	12 years	Sept. 1, 1931	4½%	17,000.00
City of Detroit	Sept. 1, 1919	13 years	Sept. 1, 1932	4½%	17,000.00
City of Detroit	Sept. 1, 1919	14 years	Sept. 1, 1933	4½%	17,000.00
City of Detroit	Sept. 1, 1919	15 years	Sept. 1, 1934	4½%	17,000.00
City of Detroit	Sept. 1, 1919	16 years	Sept. 1, 1935	4½%	17,000.00
City of Detroit	Sept. 1, 1919	17 years	Sept. 1, 1936	4½%	17,000.00
City of Detroit	Sept. 1, 1919	18 years	Sept. 1, 1937	4½%	17,000.00
City of Detroit	Sept. 1, 1919	19 years	Sept. 1, 1938	4½%	17,000.00
City of Detroit	Sept. 1, 1919	20 years	Sept. 1, 1939	4½%	17,000.00
City of Detroit	Sept. 1, 1919	21 years	Sept. 1, 1940	4½%	16,000.00
City of Detroit	Sept. 1, 1919	22 years	Sept. 1, 1941	4½%	16,000.00
City of Detroit	Sept. 1, 1919	23 years	Sept. 1, 1942	4½%	16,000.00
City of Detroit	Sept. 1, 1919	24 years	Sept. 1, 1943	4½%	16,000.00
City of Detroit	Sept. 1, 1919	25 years	Sept. 1, 1944	4½%	16,000.00
City of Detroit	Sept. 1, 1919	26 years	Sept. 1, 1945	4½%	16,000.00
City of Detroit	Sept. 1, 1919	27 years	Sept. 1, 1946	4½%	16,000.00
City of Detroit	Sept. 1, 1919	28 years	Sept. 1, 1947	4½%	16,000.00
City of Detroit	Sept. 1, 1919	29 years	Sept. 1, 1948	4½%	16,000.00
City of Detroit	Sept. 1, 1919	30 years	Sept. 1, 1949	4½%	16,000.00
					$2,855,114.40

REPORT OF THE SUPERINTENDENT AND GENERAL MANAGER

For the Fiscal Year Ending June 30, 1920

To the Board of Water Commissioners of the City of Detroit, Michigan.

Gentlemen:

The following report of the operations of the Department of Water Supply, for the year ending June 30, 1920, is respectfully submitted:

POPULATION

The population of Detroit as determined by the United States census for 1920 was 993,739, an increase of 115% over the population in 1910, which was 465,766. As the material underlying Detroit is mostly clay of an impervious nature, practically all of this population is supplied by the Municipal Plant. To be exact, 993,739 people in Detroit are supplied with water, and in addition a population outside of the city limits of 72,501 is supplied. This outside territory includes the villages of River Rouge, Ecorse, Hamtramck, Oakwood, Grosse Pointe Park and Ferndale, the supply for each being metered at the city limits.

AREA OF CITY

Detroit now has an area of 79,689 square miles, and there has been no increase in area during the past year.

CONSUMPTION OF WATER

The consumption of water for the past five years as measured by Venturi meters at the Pumping Station, with data relating to taps, meters and population, is given below:

Year Ending June 30	Total Yearly Consumption Gallons	Total Population Supplied in Detroit	Number of Meters in Detroit	Percentage of Taps Metered in Detroit	Daily per Capita Consumption in Detroit Gallons
1916	46,688,949,000	734,562	77,715	64.6	167
1917	52,040,254,250	808,327	89,398	67.4	169
1918	52,816,963,375	900.100	94,805	69.	153
1919	48,716,817,350	976,450	127,367	89.9	129
1920	55,631,262,500	993,739	141,278	97.4	144

In a direct pressure system it is necessary to have boilers, pumps, mains and other equipment of capacities that will allow pressures to be maintained during the times of greatest consumption, to-wit, the maximum day and the maximum hour.

In the following table are shown the average daily consumption in gallons during the past eleven years; the percentage that the maximum daily is over the average daily consumption; and the percentage that the maximum hourly is over the average hourly consumption. These figures are of particular interest because of the large number of meters that have been set in Detroit during the past few years, and from that it appears that meters have reduced the maximum daily and the maximum hourly pumpage in a slightly greater degree than the average daily pumpage:

Year	Maximum Daily Consumption Gallons	Average Daily Consumption Gallons	Percentage of Maximum over Average Consumption	Maximum Hourly Consumption Gallons	Percentage of Maximum Hourly over Average Hourly Consumption
1910	118,000,000	85,411,383	38	6,096,680	71
1911	127,955,650	92,260,322	38	6,747,390	76
1912	147,463,280	105,833,013	39	7,014,420	59
1913	142,665,410	105,589,104	35	7,694,270	74
1914	153,750,000	111,575,200	37	7,614,982	63
1915	147,929,035	122,162,805	21	7,957,320	56
1916	158,450,000	127,565,434	24	8,035,600	51
1917	188,920,250	142,576,039	32	10,241,050	72
1918	209,600,000	144,704,009	44	10,284,290	71
1919	180,540,000	133,470,732	38	10,025,360	80
1920	190,334,750	151,997,985	25	10,144,770	60

It should be remembered that the maximum pumpage depends somewhat on summer and winter weather conditions, and this alone will account for some variations in the ratio of average and maximum pumpage.

METERS AND SERVICE CONNECTIONS

The work of metering the city has progressed rapidly, for during the year 2,358 old connections have been metered, and 10,572 meters have been set on new connections, so that at the present time 97.4% of all services in Detroit that are in use are metered. Meters have now been set on nearly all of the old service connections that can be metered without undue expense, and at least two or three years will elapse before all unmetered services have been removed.

DISTRIBUTION SYSTEM

The work of laying pipe in all sizes has gone on rapidly notwithstanding the great difficulty that has been experienced in obtaining material and in securing labor. In all, 109 miles of pipe were laid and five miles were discontinued, and to this amount should be added 14.16 miles of pipe which was acquired by annexation in 1918 and not included in the report of 1919. In addition, the villages, which are supplied by this Board, laid 25.7 miles of pipe. The number of miles of pipe in service June 30 for the past five years is as follows:

Year	Miles Detroit	Miles Entire System
1916	868.88	1001.34
1917	931.21	1058.81
1918	1078.666	1190.044
1919	1121.766	1224.027
1920	1240.132	1368.092

MAINS

Construction of the 48-inch force main in Garland Avenue, French Road and Six-Mile Road has progressed northward from the Pumping Station to a point in French Road about 5,600 feet north of Gratiot Avenue.

On March 9, 1920, a contract was entered into with Julius Porath, Contractor, for continuing the work on this line by furnishing and laying 20,930 lineal feet of 48-inch lock-bar steel pipe at a price of $31.94 per foot. This pipe is made from sheets one-half inch in thickness, is dipped in "hermastic" coating, and will continue as far west as Dequindre Street.

When this main has been completed and a 48-inch main has been constructed from the Pumping Station through St. Paul Avenue, as mentioned in the Annual Report for the year ending June 30, 1919, the force main capacity will be sufficient to care for all the water that can be drawn through the present intake, with the Booster Station completed and in operation.

During the past twelve months, 7 miles of mains have been laid and put in service in diameters of 24 inches and larger, as follows:

Size Inches	Length Feet	Location	Completed
24	1000	Charlevoix, west of Connors	July 9, 1919
24	7098	LaBelle, Linwood to Turner	Oct. 30, 1919
24	2340	Charlevoix, Gladwin to Bezner	July 9, 1919
24	1330	Charlevoix, Bezner to Lenox	Dec. 1919
24	12500	Gratiot, Connors Lane to City Line	Dec. 1919
36	1050	Lafayette, St. Aubin to Orleans	Dec. 5, 1919
42	461	Fenkell, West of Linwood	Nov. 22, 1919
36	1095	Lafayette, Orleans to Chene	Dec. 5, 1919
42	38	Linwood at Fenkell	Mar. 3, 1920
42	3207	Fenkell, Livernois to Parkside	June 26, 1920
42	6500	Warren, Grand Blvd., west to Alden	June 19, 1920

PUMPING STATION AND FILTRATION PLANT

The installation of the two 37,500,000 gallon pumping engines by the Worthington Pump and Machinery Corporation, the replacement of the roof on the old Pumping Station, and the progress that is being made with the construction of the filtration plant are covered in the report of the Civil Engineer.

WIDENING AND DEEPENING THE RIVER ROUGE

That the River Rouge may be made navigable from the Detroit River to the Ford Blast Furnaces, the United States Government has directed that the channel be dredged to a width of 250 feet at the water line, and to a depth of 22.5 feet below mean water, and that bridges shall be reconstructed to give a clear opening of 125 feet. In order that this work may proceed, it becomes necessary to re-lay the 24-inch water pipe crossing at Fort Street supplying the village of Oakwood, and the 16-inch water pipe crossing at West Jefferson Avenue, and supplying the villages of River Rouge and Ecorse.

FIRE LINES

The area and population of the city during the past five years has increased at such a rapid rate that the efforts of all of the forces in the Construction Department have been directed toward the laying of pipes to supply water for the outlying and less densely populated sections. Recently, however, attention has been turned to the needs of increased supply and better fire protection in the downtown section and the manufacturing districts, and lines have been completed, as follows:

Location		Size Inches	Length Feet
Prospect	Plymouth to Bonaparte	16	2720
Colby	Russell to Railroad	12	543
Charlevoix	West of Connors	24	1000
Connors	Harper to Gratiot	8	2600
Charlevoix	Gladwin to Bezner	24	2340
Bezner	Waterloo to Charlevoix	12	860
Charlevoix	Bezner to Lenox	24	1330
Lafayette	Chene to Orleans	36	2250
Charlevoix	Lenox to Alter	24	3600
Seven Mile	Filer—Van Dyke	8	3770
Morrell	Jefferson to Fort	12	2360
Lambert	Maxwell to Gratiot	8	2900
Colfax	Tireman to Daily	8	2100
			28373

It is recommended that the laying of pipe lines for better supply and fire protection be continued, and it is estimated that 68 miles of pipe from 8 inches to 24 inches in diameter, costing $2,624,622.20, will be required in the immediate future.

WATER FOR FIRE PROTECTION

It is ever the endeavor of the Board to furnish an adequate supply of water for fire protection. Property conditions in many parts of the city have changed to such an extent in recent years that the Board finds that many of the pipes which were of sufficient capacity with conditions as they were at the time they were laid, are now unable to furnish the amount of water that is required by the Fire Department.

In order that new pipes may be laid or old ones replaced in the most economical manner, and at the same time of sufficient capacity to serve the city for some years to come, a hydrant flow survey of the entire city is now in progress. This is being carried out by the Board in a manner that meets the approval of the National Board of Fire Underwriters. Fire hydrants are generally taken in groups of four, and the capacity of each hydrant and each group is determined by pressure gauges and by measuring the flow of water from the hydrants wholly or partially open. It is expected that this survey will continue through the summer and fall of the present year.

DEPTH OF WATER PIPE TRENCHES

During the early days of the Water Works it was customary to lay water pipes with a cover not exceeding 4½ feet. This ordinarily gave but little trouble from freezing, for during the mildest winters the frost will not penetrate to a depth of more than 4 feet, and during the more severe winters, as the number of meters on service connections were few, water was allowed to run with but little restrictions.

On September 18, 1919, a resolution was adopted by the Board directing that thereafter all pipes laid in unpaved streets should have a cover of at least 6 feet, and likewise on September 30, that all service connections in unpaved streets should be laid with the same depth of cover.

DIVISION OF SYSTEM

For some years prior to 1902 a number of valves along a line approximating the 130-foot contour were wholly or partially closed, thus making a partial division of the system. This line crosses Woodward Avenue near Adelaide Street. In 1902 a complete separation or division was made along the line approximating the 135-foot contour. Beginning at the western city limits, this line follows Tireman Avenue, Moore Place and McGraw Avenue, to Grand River Avenue, near Grand River Avenue to Calumet Avenue, along Calumet Avenue and Canfield to St. Antoine Street, crossing Joseph Campau to Scott Street, Mt. Elliott at Theodore Street, following Sheridan Avenue, from Palmer to Georgia Avenue, thence in Connors Avenue, north of Gratiot Avenue.

Since 1902 the "high" service district and "low" service district as formed by this line have been operated as independent systems. During the past year this "low" service district, in which was consumed about 67% of the entire pumpage, was divided along the line beginning at the Detroit River and following Sixth Street, to High Street, thence west along High Street to Montcalm Street, crossing Gratiot at Russell Street, Elmwood Avenue at Monroe Avenue, Mt. Elliott at St. Paul Avenue, along Kercheval Avenue to Pennsylvania Avenue, crossing Jefferson Avenue at Pennsylvania Avenue. This division divided the former "low" service district into two districts, now called respectively the "intermediate district" and "low district." The division was made as indicated December 2, 1919.

PIPE LAYING EQUIPMENT

The Board now has the following machinery and equipment engaged in water pipe construction:

2—Buckeye Wheel Type Trenching Machines
4—Austin Boom Type Trenching Machines
1—Austin Boom Type Trenching Machine (Steam Power)
2—6-Ton Bucyrus Steam Cranes
9—Austin Boom Backfillers
2—Oshkosh Backfillers, without Booms
1—Buckeye Automatic Concrete Breaker
1—Buckeye Straight Drop Concrete Breaker
1—Rex Concrete Mixer
2—Koehring Concrete Mixers
1—Austin 17' Steam Concrete Mixer
1—Ingersoll-Rand Portable Air Compressor
1—Chicago-Pneumatic Portable Air Compressor
1—Sullivan Portable Air Compressor
1—No. 4 King Road Grader
1—3" Pulsometer with Boiler
1—4" Pulsometer without Boiler
2—11" x 11" x 12" Locomotive Type Air Compressors mounted on on Bucyrus Steam Crane
1—11" x 11" x 12" Locomotive Type Air Compressor mounted on Austin Steam Trenching Machine
1—15-Ton Double Truck Browning Locomotive Crane
2—20"-Ton Double Truck Orten & Steinbrenner Locomotive Crane
4—4 H. P. Gasoline Parker Mud Pumps
14—3 H. P. Gasoline Parker Mud Pumps
1—2½ H. P. Gasoline Novo High Pressure Test Pump
1—3 H. P. Gasoline Driven Odorless Pump

MAINTENANCE DEPARTMENT

For many years all pipe laying and similar construction work has been prosecuted under the direction of a Superintendent of Construction, and the management and supervision of the Storage Yard, leak gangs and men engaged in maintenance work of the distribution system has been in charge of a Superintendent of Storage Yard. On March 1, 1920, a resolution was adopted directing the organization of a Maintenance Department, in charge of a Superintendent of Maintenance, to include all work pertaining to the repair of leaks, the maintenance of valves, manholes, gate boxes, the lowering and moving of old pipes and pipes in service, and the laying of new pipes to replace the older and smaller ones.

REPAIRING SERVICE LEAKS

Most of the water leaks in the streets of Detroit occur in the service connections leading into private property. These connections are installed by the property owner and when leaks occur in the same they are repaired by him at his expense. Reports of leaks reach this department and are immediately investigated, and when found to be in the service connection are turned over to the property owner for repairs. Frequently considerable time elapses before repairs are made; in the meantime the excavation in the street is a menace to traffic. It is very desirable that some plan be worked out by which this Board may repair such leaks in public streets as it deems advisable, and collect the cost of doing such work from the owner or occupant of the property.

FIRE CONNECTIONS

On September 30, 1920, the Board directed that all fire lines installed thereafter should be metered. There are now in Detroit 126 metered and 306 unmetered fire lines.

LEAK SURVEY

In June, 1918, the Pitometer Company of New York was engaged to conduct a water waste survey of the section bounded on the west by Woodward Avenue, on the north by Erskine Street, on the east by Orleans Street, and on the south by the Detroit River. The procedure of the survey was as follows:

1. Each section was divided into districts and the flow of water throughout twenty-four hours was gauged in each district.

2. Further investigation of all districts where excessive flow was indicated, which resulted in the location of all underground leaks on the mains or services large enough to be measured by the Pitometer Company.

3. Checking up on manufacturing concerns for the purpose of detecting any illegal use of metered water, and testing meters over four inches in place.

4. At the completion of the survey, the report of the work in detail accompanied by charts showing the variation of the flow into each district throughout the twenty-four hours and map showing boundaries of each district and location of all gauging points.

The company reported on this section February 2, 1920. This report shows an average daily consumption of 14,681,000 gallons in this section; 1,939,000 gallons per day were found wasting through underground leaks on mains and services from defective connections. These leaks were located and repaired during the time that the waste survey was being made; 2,002,000 gallons per day were found wasting through 1,995 fixtures. These fixtures were discoverd by house to house inspection, made by Water Board inspectors working under the supervision of the Pitometer Company. Notices were left with the property owners ordering them to make repairs of any leaks discovered. Ten days to two weeks later another inspection was made and if such repairs had not been made the water supply was cut off at the curb by the Board's employees. Seventy-five per cent of the fixture leaks were found on metered services. A few large meters were found stopped, and others under-registering.

In conjunction with this work it was found necessary to locate and operate practically every valve in the section, consequently the valve inspection was carried on along with this work. Whenever leaky or broken valves were found they were immediately reported to the Storage Yard for repairs.

Since the time of the first investigation, the Pitometer Company was engaged to continue the work in the section bounded on the west by Vinewood, on the north by the division line between "high" and "intermediate" pressure service, on the south by the Detroit River and on the east by Beaufait Avenue. The district east of Woodward Avenue was reported on under date of March 10, 1920, and is known as Section No. 4. The survey of the section west of Woodward, known as Section No. 3 has not yet been completed.

Section No. 4 comprises the area south of the division line between "high" and "intermediate" service, Detroit River, Woodward Avenue and Beaufait, exclusive of the district covered by Section No. 1. The report shows the average daily consumption in Section No. 4 as 10,701,000 gallons; 427,500 gallons were found wasting through underground leaks. These leaks were located and repaired. 3,000,400 gallons were wasting through 1,648 fixtures leaking. Of these fixtures 631 were faucets, 812 toilets, 87 service pipes, 9 hydrants and 109 miscellaneous fixtures. The fixture leaks in this section was approximately 42% of the total subdivision night rate flow; 78% of these fixture leaks were on metered services. Meters 4 inches and over in this section were tested as in Section No. 1 and one was found to be 17% underregistering.

METER RATE DEPARTMENT

Because of delay in receiving comptometer equipment and difficulty in securing the necessary help, it is impossible to give complete statistics from this department for the first half of the year.

During the fiscal year bills were rendered covering a total of 5,073,521,600 cubic feet of water and the total charge for this quantity was $2,433,548.27. During the last six months of the fiscal year, 265,592 regular meter bills were rendered, covering a total of 2,294,965,500 cubic feet of water, and the total charge for this quantity was $1,050,272.50.

Of the quantity mentioned, 10.4% was billed at the rate of $1.00 per thousand cubic feet or minimum, 18.9% at the rate of 50c per thousand cubic feet, and 70.7% at the rate of 35c per thousand cubic feet. During this six months period there were 87 statements for 24,075,900 cubic feet of water at one-half the regular rate, and this amounted to $4,260.33; also 53 statements were rendered for 240,075,900 cubic feet of water at double the regular rate, amounting to $168,792.40. A special charge was made of .2244c per thousand cubic feet of water used at Fort Wayne, amounting to $696.33. Finally, the total amount billed for all water passing through meters after all adjustments were made, was $1,219,339.08.

WATER SOLD BY FLAT RATE

The assessed flat rate for the fiscal year amounted to $6,952.80. There were unpaid flat rate bills at the beginning of the year of $4,277.35. Duplicate payments made and not refunded amounted to $207.50. There was lost to meters during the fiscal year $91,838.10; the number of assessments remaining July 1, 1920, is 3,813, and the flat rate assessment for the fiscal year beginning July 1, 1920, amounts to $6,952.80.

OFFICE BUILDING

The extensive alterations that have been made to the office building will make it possible to continue the use of this building for a few years. The elevator was completed April 1, 1919, and the work of extending the vault to the third story was completed in March of the same year. The remodeling of the office was completed in September, 1919, and included the construction of two private offices and a balcony on the third floor; the removal of the brick walls and other obstructions on the second floor so as to provide a large room for the meter and flat rate departments; the completion and furnishing of a ladies' rest room on the second floor; the building and furnishing of a meeting room for the Water Commissioners on the second floor; the installation of steel safes on the second floor; the erection of additional cashiers' cages and a new lighting system for the first floor. In addition to the above, the offices on all floors were painted, a new floor was laid on the second floor; new ceilings were put up on the second and third floors; addressograph machines were installed in the basement; the steam heating system was changed from the hand fire boiler to central heat furnished by the Detroit Edison Company; and the Engineering Department installed on the third floor a photostat outfit in December, 1919, and a continuous blue print machine in February, 1920.

HOUSE RENUMBERING

On May 20, 1919, an ordinance adopted by the Common Council was approved by the Mayor, directing that a new house numbering plan be prepared by the City Engineer. In order that this might be put into effect January 1, 1921, it was necessary that the work of changing all the accounts and records of the Board be started May 1, and it is now in progress.

PIPE LINE EXTENSIONS ON PETITION

On September 2, 1919, Ordinance No. 669-A was passed by the Common Council regulating the extension of water mains by petition. This was repealed and superseded by Ordinance No. 701-A, passed January 20, 1920, which allows any lot owner to petition for an extension of water main upon payment of 25c per foot frontage of his lot. After this petition is received, a map is prepared showing the proper size of main and amount of pipe necessary to supply this lot. All lots fronting on this extension are assessed 25c per foot frontage, and a resolution is adopted by the Board of Water Commissioners ordering such extensions. No property owner whose lot fronts on this extension is allowed service connection until he has paid his assessment.

This Ordinance immediately allowed a great number of property owners who were not supplied with water to petition and obtain water mains in front of their property at a low cost.

The Ordinance further provides that six months or more after the extension is in service the Board of Water Commissioners shall prepare a list of lots, the assessments against which have not been paid, together with the names of all owners thereof, and shall transmit such list to the City Treasurer, who shall notify these delinquent owners by registered mail. Thirty days after the mailing of such notices the City Treasurer shall sell said lots upon which assessments have not been paid to the Controller in behalf of the City for the term of 99 years for the amount of the assessment due plus 10% per annum from the date of the laying of such main. Following such sale a certificate of sale and leases for 99 years shall be executed by the Controller to the City, attested by the City Clerk and acknowledged in the same manner as provided in other cases of sale for assessment of taxes.

The City of Detroit thereupon shall be deemed to be the owner of a 99-year lease upon each lot so sold for such assessment. Such lease cannot be assigned or relinquished by the City except to the owner of such lot upon payment to the City of the amount of such assessment, plus 10% per annum from the date when the work of laying such mains was finished.

Since September 2, 1919, the Engineering Department has received 452 petitions for water pipe under the Ordinance previously explained, and in order to carry out the provisions of that Ordinance, it was necessary to prepare 385 resolutions which were adopted. The total amount of assessments on rolls adopted was $168,279.52.

YARDS

The area of Detroit has increased to such an extent that the distance by team or motor truck to the city limits at West Jefferson Avenue and the Railroad is 7.9 miles; to Livernois Avenue and Eight-Mile Road, 9.9 miles, and to the northeastern city limits at Gratiot Avenue and Seven-Mile Road is 6.6 miles. This length of haul has made it necessary to acquire and establish two additional yards in order that deliveries may be made economically and promptly. The new western yard, having an area of 6.7 acres, is located on the Detroit Terminal Railway between Glendale and Buena Vista Avenues, and was acquired September, 1919, at a price of $42,000.00. The new eastern yard is located on the easterly side of the Detroit Terminal Railway, between Shoemaker Avenue and Harper Avenue, and about 11 acres is available for storage yard use, and this will be divided between the Department of Public Works and this Board.

In order that some idea may be gained of the amount of material issued by the storage yard, the following data is presented:

58,325 pieces of pipe in sizes from 6 inches to 48 inches, weighing 26,661 tons; 4,239 fittings, weighing 504 tons; 1,487 gate valves from 2 inches to 48 inches in diameter, and 238 tapping valves, 2 inches to 12 inches in diameter.

AUTOMOBILES

The Board now owns and operates automobiles, as follows:

18	Ford Roadsters and Light Delivery
1	Ford Coupe
11	Ford One-Ton Trucks
2	Dodge Sedans
3	Dodge Tourings Cars
10	Dodge Roadsters
17	Dodge Commercial Cars
1	Buick ¾-Ton Truck
3	Packard 2-Ton Trucks
1	Packard 3-Ton Truck
1	White 3-Ton Truck
2	White 6-Ton Trucks
3	Packard 6-Ton Trucks
1	Packard 6-Ton Dump Truck
1	Hall 7-Ton Dump Truck

In addition to the above the Board owns one Traction Motor and one 5-Ton Holt Tractor, and five private trucks are rented as needed.

SHOP FOR CONSTRUCTION MACHINERY

Proposals have been invited for the construction of a shop for construction machinery, which will be located in the western yard. This shop will be of brick and steel construction, 90 feet wide by 120 feet long, and will contain an erection floor, blacksmith shop, machine shop, carpenter shop, sheet metal room, stock room and office.

GASOLINE

This department now uses about 140,000 gallons of gasoline for the operation of autos, pipe laying and construction machinery. On April 15, 1919, a storage tank was put in use at the storage yard, having a capacity sufficient to allow gasoline to be purchased in tank cars. This plan has proven very satisfactory, and in addition to this method proving much more convenient and the clerical work having been greatly reduced, there has been a saving of about 2.6c per gallon, or about 10% of the cost of the gasoline.

COAL

The poor quality of the coal accounts for the lowering of the duty of the Pumping Station. The number of gallons pumped per pound of coal for the year ending June 30, 1917, was 953; 1918, 912; 1919, 856; and during the past year this was reduced to 773. Likewise the duty of the Pumping Station for 100 pounds of coal was reduced from 99,600,000 foot pounds for the year 1916-1917 to 81,538,499 for the year 1919-1920. For some months past fires have existed in the coal pile, and have developed in piles not over 5 feet in depth.

AUTOMOBILE ACCIDENT COMMITTEE

Since April 1, 1920, all accidents to the automobiles owned by the Board have been handled through the auto accident committee, composed of three employees of this Department, to-wit: The Auditor, Storage Yard Auditor, and Garage Foreman. A report on every accident has been made after a careful examination by the investigators, and this committee meets weekly, receives reports from the investigators, takes testimony and finally it reports with recommendations to the General Manager. During the three months that this committee has been in existence it has investigated thirty-two accidents, with findings as follows:

Drivers discharged for reckless driving	3
Drivers disciplined	2
Drivers warned	4
Damage bills sent to Corporation Counsel	4
Minor accidents—no damage	19

Respectfully submitted,

GEORGE H. FENKELL,
General Manager.

REPORT OF THE ASSISTANT SUPERINTENDENT.

For the Fiscal Year Ending June 30, 1920

To the Board of Water Commissioners of the City of Detroit, Michigan.

Gentlemen:

The following is the report of the Engineering, Construction, Maintenance and Supply Departments for the year ending June 30, 1920:

PUMPAGE AND DISTRIBUTION

All statements of water pumped are based upon the quantities recorded by Venturi Meters, which are 3.3% less than the amounts indicated by plunger displacement. This difference is accounted for by pump slippage and by the water used in the pumping station.

The total pumpage for the year was 17,582,510,000 gallons on the high service, and 22,316,83,500 gallons on the low service, and 15,731,909,000 on the intermediate service; making a total of 55,631,262,500 gallons for the entire system. The average daily consumption was 151,543,036 gallons, or 142 gallons per capita,. based upon an estimated population supplied of 1,066,240.

The following tables show details of service and the distribution of water in Detroit and surrounding villages:

CONSUMPTION OF WATER IN DETROIT AND VILLAGES

	Total Consumption Gallons	Daily Average Gallons	Estimated Population
Detroit—Unmetered	17,681,288,052	48,309,530	
Detroit—Metered	34,568,610,528	94,449,755	
Detroit—Total	52,249,898,580	142,759,285	993,739
River Rouge—Metered	412,145,003	1,126,080	15,500
Ecorse—Metered	158,026,220	431,766	4,996
Hamtramck—Metered	2,463,393,163	6,745,623	48,000
Oakwood—Metered	83,081,856	227,000	2,000
Grosse Pointe—Metered	86,951,260	237,572	2,500
Highland Park—Metered (Emergency Supply)	166,511,532	454,949	42,500
Ferndale—Metered	5,749,876	15,710	
Total—Metered	37,949,974,448	103,688,455	
Total—Unmetered	17,681,288,052	48,309,530	
Total Consumption	55,631,262,500	151,997,985	1,108,735

The water supply of all villages is metered at the village limits.

The Pumping Station records show a station duty of 80,231,085 foot pounds per 100 pounds of coal consumed.

In determining the duty, all steam used for heating and construction work is charged against pumpage. An average of 773 gallons of water was pumped per pound of coal.

The cost of pumping water, exclusive of interest and depreciation, is shown below.

COST OF PUMPAGE

	Total	Cost per Million Gallons	Cost per Million Gallons Raised 100′
Labor	$156,825.83	2.82	2.28
Fuel	209,672.27	3.77	3.04
Oil and Supplies	6,402.09	.12	.09
Miscellaneous	16,264.77	.29	.24
Total	$389,164.96	$7.00	$5.65

The pressures throughout the city are shown for the past two years in the "Table of Pressures."

CONSUMPTION.

Recorded by Venturi Meters

MONTH	HIGH SERVICE		INTERMEDIATE SERVICE		LOW SERVICE		ENTIRE SERVICE	
1919	Total Gallons	Daily Aver. Gallons	Total Gallons	Daily Aver. Gallons	Total Gallons	Daily Aver. Gallons	Total Gallons	Daily Aver. Gallons
July	1,509,310,000	48,687,419			3,246,848,750	104,737,057	4,756,158,750	153,424,476
Aug	1,445,870,000	46,963,548			3,207,216,000	103,458,581	4,663,086,000	150,422,129
Sept	1,396,050,000	46,535,000			3,126,152,750	104,205,092	4,522,202,750	150,740,092
Oct	1,424,170,000	45,940,968			3,119,859,000	100,640,612	4,544,029,000	146,581,581
Nov	1,278,090,000	42,603,000			2,867,581,750	95,593,917	4,145,671,750	138,189,058
Dec.	1,316,060,000	42,453,548	2,281,228,000	73,588,000	933,860,000	30,124,516	4,531,148,000	146,166,064
1920								
Jan	1,446,550,000	46,662,903	2,411,187,750	77,780,226	996,170,000	32,134,516	4,853,907,750	156,577,766
Feb	1,421,240,000	49,008,276	2,239,773,250	77,233,560	966,946,750	33,342,991	4,627,960,000	159,929,655
Mar	1,591,950,000	51,353,225	2,322,520,000	74,920,000	998,407,000	32,206,677	4,912,877,000	158,479,903
Apr	1,507,410,000	50,247,000	1,970,810,000	65,693,667	907,634,750	30,254,492	4,385,854,750	146,195,158
May	1,573,470,000	50,757,097	2,146,150,000	69,230,645	943,305,000	30,429,193	4,662,925,000	150,416,935
June	1,662,340,000	55,411,333	2,360,240,000	78,674,667	1,002,861,750	33,428,725	5,025,441,750	167,514,725
Year	17,582,510,000	48,061,503	15,731,909,000	42,983,358	22,316,843,500	60,974,982	55,631,262,500	151,997,985

NOTE—On Dec. 2, 1919, the former "low" service district was divided into a new "low" service and a new "intermediate" service district

COMPARISON OF METER AND PUMP RECORDS.

Pumping Station

		Venturi Meter Measurements Gallons	Engine Plunger Displacement Gallons
Maximum Day (Entire System)	June 15, 1920	190,334,750	197,391,360
Minimum Day " "	Nov. 30, 1919	116,308,000	119,959,790
Average Daily " "		151,997,985	157,143,601
Total for Year " "		55,631,262,500	57,514,557,980
Maximum Hour " "	June 15, 1920, Meter 10 to 11 A. M.	9,760,000	....
	June 15, 1920, Plunger 7 to 8 P. M.	....	10,144,770
Minimum Hour " "	Jan. 14, 1920, Meter 3 to 4 A. M.	3,010,000	....
	Nov. 24, 1919, Plunger 3 to 4 A. M.	....	3,653,270
Maximum Hour (High Service)	June 15, 1920, Meter 7 to 8 P. M.	3,310,000	....
	June 15, 1920, Plunger 7 to 8 P. M.	....	4,013,880
Minimum Hour " "	Nov. 17, 1919, Meter 3 to 4 A. M.	950,000	....
	Jan. 28, 1920, Plunger 11 to 12 A. M.	....	811,740
Maximum Hour (Intermediate Service)	June 15, 1920, Meter 6 to 7 P. M.	4,950,000	....
	Jan. 12, 1920, Plunger 9 to 10 A. M.	....	5,208,950
Minimum Hour (Intermediate Service)	Apr. 30, 1920, Meter 1 to 2 A. M.	1,540,000	....
	Dec. 8, 1919, Plunger 2 to 3 A. M.	....	141,900
Maximum Hour (Low Service)	July 29, 1919, Meter 11 to 12 A. M.	6,110,000	....
	Sept. 8, 1919, Plunger 6 to 7 P. M.	....	7,108,060
Minimum Hour " "	Apr. 20, 1920, Meter 1 to 2 A. M.	640,000	....
	Dec. 8, 1919, Plunger 2 to 3 A. M.	....	57,120
Average Daily (High Service)		48,061,303	59,913,081
Average Daily (Intermediate Service)		42,985,358	32,988,169
Average Daily (Low Service)		50,974,982	57,187,702
Rate per day @ rate of maximum hour (Entire System)		234,240,000	243,474,480
Rate per day @ rate of maximum hour (High Service)		79,440,000	96,333,120
Rate per day @ rate of maximum hour (Intermediate Service)		118,800,000	125 014,800
Rate per day @ rate of maximum hour (Low Service)		146,640,000	170,593,440
Rate per day @ rate of minimum hour (Entire System)		72,240,000	87,678,480
Rate per day @ rate of minimum hour (High Service)		22,800,000	19,481,760
Rate per day @ rate of minimum hour (Intermediate Service)		36,960,000	3,405,600
Rate per day @ rate of minimum hour (Low Service)		15,360,000	1,370,880

TABLE "A"

SUMMARY OF BACTERIAL ANALYSES

DETROIT, MICHIGAN

July 1. 1919—June 30. 1920

	RAW WATER Obtained in Intake						TREATED WATER After Chlorination						TAP WATER After Chlorination				
	20° Agar	37° Agar	20° Gelatin	B. Coli 10 C. C.	B. Coli 1 C. C.	Tur-bidity	20° Agar	37° Agar	20° Gelatin	B. Coli 10 C. C.	B. Coli 1 C. C.	Tur-bidity	20° Agar	37° Agar	20° Gelatin	B. Coli 10 C. C.	B. Coli 1 C. C
July, 1919	33.0	8.4	31.0	35/390	0/78	02.8	2.9	2.9	2.1	0/390	0/78	20.8	11.5	4.9	10.0	6/130	0/26
August	16.5	8.4	14.2	37/390	0/78	20.6	2.3	2.8	1.4	4/390	0/78	20.6	5.2	3.8	3.0	2/130	0/26
September	24.8	9.3	22.7	94/375	2/75	26.6	2.3	3.7	2.0	3/375	0/75	26.6	5.7	5.2	5.7	4/125	0/25
October	22.9	7.9	22.9	127/405	1/81	26.7	2.7	3.2	1.9	2/405	0/81	26.7	7.8	4.6	7.7	2/135	0/27
November	120.6	8.8	128.8	150/360	2/72	31.9	2.8	3.4	2.1	4/360	0/72	31.9	5.2	5.2	5.3	2/120	0/24
December	277.8	11.1	304.4	111/390	5/78	35.8	3.4	5.1	3.0	0/390	0/78	35.8	4.8	5.5	4.4	0/130	0/26
January, 1920	798.0	5.1	821.7	122/390	5/78	9.6	4.9	2.7	5.7	2/390	0/78	9.6	5.4	2.1	4.8	1/130	0/26
February	396.4	6.4	410.3	129/360	3/72	6.3	13.4	2.4	12.7	15/360	0/72	6.3	7.6	2.7	6.4	0/120	0/24
March	2498.0	128.3	2653.3	125/445	7/89	24.3	45.3	22.2	43.8	5/445	0/89	24.3	44.7	23.6	47.8	2/145	0/29
April	213.0	28.0	199.0	37/390	0/78	29.0	9.9	8.2	7.5	1/390	0/78	29.0	8.8	9.4	6.5	0/130	0/26
May	33.2	9.2	29.2	47/375	0/75	21.0	3.6	4.5	2.2	0/375	0/75	21.0	21.6	8.2	21.0	0/125	0/25
June	31.9	10.9	33.5	100/290	0/78	34.0	3.6	4.0	2.5	1/390	0/78	34.0	48.0	8.1	42.0	5/130	0/26
Total	......	......	......	1114/4660	25/932	......	......	......	......	37/4660	0/932	......	......	......	......	24/1550	0/310
Average	372.0	20.0	389.0	......	......	23.8	8.1	5.4	7.2	......	......	23.8	15.0	6.9	14.0	......	......

TABLE "C"

Distribution System

Total amount of pipe laid and discontinued for the year ending June 30, 1920. Net gain of 140.27 miles for this period.

Size	Feet Laid	Discon-tinued	Annexation Not in 1919 Report	Outside Detroit	Discon-tinued O. S. City
3"	....	1,164	....	....	....
4"	34	18 235	....	8,410	....
6"	273,684	6,269	51,929	94,887	....
8"	243,050	445	17,573	39,160	....
10"	2,370	....	49	....	3,500
12"	24,957	....	5,189	4,196	....
16"	8,312	....	....	....	6,319
18"	....	....	....	....	....
20"	....	....	....	....	88
24"	9,573	21	....	....	1,058
30"	4,712	....	....	....	....
36"	2,288	....	....	....	....
42"	3,225	237	....	....	....
45"	....	....	....	....	....
48"	4,401	....	....	....	....
Totals	576,606	26,371	74,740	146,653	10,965

Net Gain in Feet	760663
Net Gain in Miles	140.27
Total Pipe Discontinued in Miles	7.07

TABLE "B"

Amount of pipe of various sizes in the distributing system of the city and various villages supplied by the Detroit Water Works.

Per Cent.	Entire System	Size	Detroit	Per Cent.	Grosse Pointe Parks	Ham-tramck	River Rouge	Ecorse	Oakwood	Ferndale	Green-field	Spring-wells	Total Outside	Per Cent.
0.09	6,304	2"	6,304	0.10	....	....	....	....	....	....	....	....	....	....
0.64	46,839	3"	46,839	0.72	....	....	....	....	....	....	....	....	....	....
11.10	802,190	4"	760,102	11.62	....	20,748	10,987	1,943	....	....	8,410	....	42,088	6.23
48.00	3,467,676	6"	2,993.419	45.71	66,336	176,616	47,374	62,187	71,951	41,752	6,086	1,955	474,257	70.18
22.16	1,600,374	8"	1,466.600	22.39	44,587	47,287	9,426	12,471	4,032	8.779	....	7,192	133,774	19.81
3.53	255,365	10"	251,889	3.85	....	3,476	....	....	....	....	....	....	3,476	0.52
4.32	311,843	12"	302.730	4.62	5,856	351	402	....	2,180	....	....	324	9,113	1.35
1.99	143,847	16"	133,043	2.03	584	1,302	4,298	....	220	....	....	4,400	10 804	1.60
0.00	87	18"	87	0.00	....	....	....	....	....	....	....	....	....	....
0.00	393	20"	393	0.00	....	....	....	....	....	....	....	....	....	....
2.15	153,497	24"	151,379	2.31	....	1,492	....	....	626	....	....	....	2,118	0.31
0.82	59,363	30"	59,363	0.91	....	....	....	....	....	....	....	....	....	....
0.48	34,494	36"	34,494	0.53	....	....	....	....	....	....	....	....	....	....
2.32	167,404	42"	167,404	2.56	....	....	....	....	....	....	....	....	....	....
0.00	103	45"	103	0.00	....	....	....	....	....	....	....	....	....	....
2.40	173,751	48"	173,751	2.65	....	....	....	....	....	....	....	....	....	....
100.00	7,223,530	Feet	6,547,900	100.00	117,363	251,272	72,487	76,601	79,009	50,531	14,496	13,871	675,630	100.00
100.00	1,368,092	Miles	1,240,132	100.00	22,227	47,589	13,728	14,507	14,965	9,571	2,746	2,627	127,960	100.00
000.00	0,000,000		0,000,000	000,0000	000.00	000,000	000,000	000,000	000,000	000,000	000,000	000,000	000,000	000,000

TABLE "D"

Cost Per Foot of Water Mains

Subdivided into material, labor, overhead expense, power machine expense.

Size	No. of Feet	Material, Etc.	Labor	Overhead Expense	Power Machine	Total
6"	273,684	1.24	0.52	0.16	0.13	2.05
8"	243,050	1.77	0.77	0.21	0.13	2.88
10"	2,370	2.32	1.28	0.30	0.06	3.96
12"	24,957	3.01	1.46	0.34	0.08	4.89
16"	8,312	4.33	1.26	0.31	0.68	6.58
24"	9,573	7.72	2.27	0.64	0.89	11.52
30"	4,712	11.83	5.78	1.36	0.55	19.52
36"	2,228	19.79	14.34	5.47	1.27	40.90
42"	3,225	23.84	4.34	1.14	1.39	30.71
48"	4,401	29.46	5.06	1.06	1.71	37.29
Totals	576,606	105.31	37.11	10.99	6.89	160.30

TABLE "E"

Construction Cost of Mains

Showing cost of mains of various sizes, material, labor, overhead expense and power machine expense.

Size	No. of Feet	Material, Etc.	Labor	Overhead Expense	Power Machine	Total
6″	273,684	338,884.49	144,611.74	44,559.32	33,058.94	561,074.49
8″	243,050	432,168.42	188,200.25	49,574.33	29,206.10	699,149.10
10″	2,370	5,509.52	3,038.01	697.24	134.56	9,379.33
12″	24,957	75,055.57	36,344.00	8,418.45	2,151.56	121,969.58
16″	8,312	36,025.91	10,510.87	2,526.58	5,636.39	54,699.75
24″	9,573	73,921.10	21,698.00	6,089.07	8,558.26	110,266.43
30″	4,712	55,756.45	27,229.90	6,403.98	2,611.23	92,001.56
36″	2,228	45,268.26	32,881.63	12,528.34	2,912.43	93,590.66
42″	3,225	76,908.56	14,007.22	3,689.98	4,436.73	99,042.49
48″	4,401	129,620.73	22,281.02	4,679.01	7,532.98	164,113.74
Totals	576,606	1,269,232.68	500,994.76	139,204.72	96,239.18	2,005,671.34

BREAKS IN MAINS.

During the year there were 75 breaks in mains of various sizes, and five of these were in pipes 24 inches in diameter, or larger, as follows:

July 24, 1919, the 42-inch pipe in Congress Street burst at the intersection of Chene Street, at 10:02 p. m., and the controlling gates were closed at 10:40 p. m. The break extended along the entire length of the pipe on the north. Repairs were made and the pipe was put in service at 10:45 p. m., July 25. This pipe was laid in 1875.

August 30, 1919, the 30-inch pipe in Canfield Avenue burst 114 feet west of the west line of Cass Avenue, at 12:20 a. m., and the controlling valves were closed at 1:00 a. m., August 31. A piece from the hub end "U" shaped and running back 8 feet 6 inches, was blown clear off the main, but to save time in making repairs the entire length was removed. The break was repaired the same day and all gates controlling the shut-off were open at 8 p. m. This pipe was laid in 1882.

January 28, 1920, the 42-inch main in Hurlbut Avenue burst opposite (new No.) 1569 Hurlbut Avenue, between Jefferson Avenue and Kercheval Avenue, at 6:30 p. m. The 42-inch gate at Kercheval and Hurlbut controlling the shut-off was closed at 7:10 p. m. The break extended along the top of the entire length of the pipe. The break was repaired January 31, and the main restored to normal service at 5:00 a. m., February 1. This pipe was laid in 1902 and supplies the high service district.

On February 19, 1920, the 24-inch pipe in Abbott Street burst about 75 feet west of the west line of First Street, at 10:30 p. m. The controlling gates were closed at 11:20 p. m. The break occurred along the bottom of the pipe, about 7 feet from the spigot end and was repaired by using one piece of 24-inch spigot pipe 7 feet 9 inches long and a hub piece 4 feet long with sleeve. The valves controlling this shut-off were opened February 22, at 2 a. m. This pipe was laid in 1873.

About February 27, 1920, a leak was reported in Palmer Boulevard, about 100 feet east of the east line of Hull Avenue. From a surface inspection it did not appear serious, but on March 1, at 10 a. m., a report was received that the leak had increased very considerably. As the main in Palmer Boulevard (Six-Mile Road) was shut off some distance to the west to allow a connection to be made, the leak was allowed to run until 7 p. m., March 4, at which time a shut-off was made. On examination a break was found in the 48-inch main extending 20 inches along the bottom from the hub end of the pipe and then upward in an irregular line for 15 inches on the south side of the pipe. Repairs were made and the main was returned to service at 9 a. m., March 10. The shut-off extended from Dequindre Street to Woodward Avenue, a distance of 6,700 feet, and it was necessary to pump all of the water contained in the pipe. This pipe was laid in 1918.

Table "F" shows the number of service connections installed and removed during the year, and the total number in the system. There are a large number of these connections which must be omitted from the totals used in computing the percentage of services metered for the reasons which follow. The villages of River Rouge, Ecorse, Hamtramck, Oakwood and Grosse Pointe Parks are supplied with water from the Detroit Water Works System through meters at the village limits, and each village sells water to its inhabitants at its own rates and through its own service meters. There were also a number of service connections installed by this Board in the present City of Highland Park previous to the time that Highland Park acquired a pumping plant of its own and began making its own service connections. There have also been a large number of service connections installed in advance of paving to supply vacant lots, so that it would not be necessary at a later date to tear up a comparatively new pavement. Each unmetered fire plant in the city is provided with one or more corporation cocks used for testing purposes, and in the records kept by the Storage Yard, from which Table "F" is derived, these are counted as service connections installed.

The following deductions should therefore be made from the total number of service connections:

Service connections in villages, the supply of which is metered at the village limits	10,136
Connections installed in advance of paving to supply vacant lots	8,762
Test cocks on fire plant connections	800
Total Service connections deducted in determining the percentage of service metered	19,688
Number of Metered connections	141,278
Number of Unmetered connections	3,813
Total Service connections for all purposes	164,799

The setting of meters has progressed rapidly during the year, and at the present time about 97.4% of all services are metered, bearing in mind the restrictions given above.

Tables "G" to "L" inclusive, give data concerning the meters in service.

TABLE "F"

Service Connections

Size	Installed	Removed	Net Increase	Total in System
⅝"	7,204	85	7,119	112,904
¾"	2,306	2	2,304	8,965
1"	835	33	802	38,935
1½"	93		93	338
2"	81	1	81	1,727
3"	81		81	1,004
4"	40		40	549
6"	35		35	297
8"	11		11	47
10"	2		2	7
12"	4		4	6
Total	10,692	120	10,572	164,770

TABLE "G"

Number of Meters Set Year Ending June 30, 1920

	⅝″	¾″	1″	1½″	2″	3″	4″	6″	8″	10″	16″	24″	Ind.	Misc.	Total
In service July 1, 1919......	94,582	24,506	5,287	1,036	955	387	459	142	4	1	1	2	25	5	127,192
Set during year ending June 30, 1920...............	24,133	5,057	1,038	79	122	126	20	18	....	2	....	....	....	8	30,603
	118,715	26,563	6,325	1,115	1,077	513	279	160	4	3	1	2	25	13	157,795
Removed during year ending June 30, 1920..........	12,898	3,099	614	30	16	20	7	7	....	....	....	....	1	....	16,692
NET GAIN...............	11,235	1,958	424	49	106	106	13	11	....	2	....	....	....	13	13,911
Error of 1918 and 1919......	21	196													
Error of 1918 and 1919......	11,214	2,154													
TOTAL in service July 1st, 1920.................	105,796	26,639	5,711	1,085	1,061	493	272	153	4	3	1	2	24	13	141,278

TABLE "I"

Kind of Meters in Service Year Ending June 30, 1920

NAME	⅝"	¾"	1"	1½"	2"	3"	4"	6"	8"	10"	16"	24"	Ind.	Misc.	Total
Buffalo American	38	10	7	5	1	....	....	....	....	....	....	....	....	....	61
Desper Indicator	....	....	....	....	....	....	....	....	....	....	....	....	24	....	24
Gamon Watch Dog	86,765	15,566	1,171	328	376	104	....	....	....	2	....	....	....	....	104,312
Gamon Watch Dog Current	....	....	....	....	....	....	24	49	....	....	....	....	....	....	76
Hersey Detector	....	....	....	....	....	1	8	19	1	....	....	....	11	....	40
Hersey D	24	7	2	12	14	5	2	1	....	....	....	....	1	....	68
Hersey Rotary	....	....	....	2	1	....	2	....	....	....	....	....	....	....	5
Hersey Torrent	....	....	....	....	....	5	1	3	....	....	....	....	....	....	9
National Nash	8,181	6,145	961	136	67	27	13	....	....	....	....	2	....	....	15,532
National Crown	....	....	2	....	....	....	....	....	....	....	....	....	....	....	2
Neptune Crest Trident	....	....	....	....	....	....	....	....	....	....	1	....	1	....	2
Neptune Trident	321	14	9	3	4	....	....	....	....	....	....	....	....	....	351
Empire Compound	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1
Pittsburg Eureka	....	....	....	....	....	....	1	1	....	....	....	....	....	....	2
Pittsburg Keystone	33	8	6	3	2	....	2	....	....	....	....	....	....	....	54
Thomson O. S.	2,171	691	434	97	105	49	18	5	....	....	....	....	....	....	3,570
Thomson Lambert	2,143	750	2,087	337	330	219	115	34	....	....	....	....	....	....	6,015
Thomson Bee	74	59	24	35	28	6	5	....	....	....	....	....	....	....	231
Union King	33	9	2	2	3	....	....	....	....	....	....	....	....	....	49
Union Nilo	....	....	....	....	1	....	1	....	....	....	....	....	....	....	2
Worthington	6,013	3,401	1,006	125	128	76	76	41	....	....	....	....	....	....	10,866
Worthington Piston	....	....	....	....	1	1	....	....	....	....	....	....	....	....	2
Worthington Turbine	....	....	....	....	....	....	....	....	4	....	....	....	....	....	4
TOTALS	105,796	26,639	5,711	1,085	1,061	493	272	153	4	3	1	2	24	13	141,268

TABLE "J"

Cost of Repairing Meters Year Ending June 30, 1920

Damaged by Hot Water

Sizes	Number	Labor	Material	Total	Average Labor	Average Material	Average Cost
⅝"	2684	$4,738.05	$ 518.98	$5,257.03	$1.76	$0.019	$1.95
¾"	1433	2,605.32	391.28	2,996.60	1.82	.027	2.09
1"	235	493.02	99.00	592.02	2.10	.037	2.47
1½"	11	38.11	9.65	47.76	3.46	.088	4.34
2"	11	45.45	4.67	50.12	4.13	.042	4.55
4"	2	10.25	1.17	11.42	5.12	.059	5.71
Total	4376	$7,930.20	$1,024.75	$8,954.95			

Damaged by Frost

Sizes	Number	Labor	Material	Total	Average Labor	Average Material	Average Cost
⅝"	4107	$5,458.82	$2,681.31	$8,140.13	$1.33	$0.065	$1.98
¾"	286	424.22	157.10	581.32	1.48	.059	2.07
1"	43	88.58	62.68	151.26	2.06	1.46	3.52
1½"	2	12.50	10.00	22.50	6.25	5.00	11.25
2"	2	6.28	.67	6.95	3.14	.33	3.47
6"	2	10.45	4.00	14.45	5.22	2.00	7.22
Total	4442	$6,000.85	$2,915.76	$8,916.60			

Damaged Because of Wear and Tear

Sizes	Number	Labor	Material	Total	Average Labor	Average Material	Average Cost
⅝"	4751	$7,272.64	$1,121.06	$8,393.70	$1.53	$0.023	$1.76
¾"	818	1,408.98	378.77	1,787.75	1.72	.046	2.18
1"	368	710.15	275.79	985.94	1.93	.074	2.67
1½"	159	581.62	289.84	871.46	3.66	1.82	5.48
2"	160	622.98	288.90	911.88	3.89	1.80	5.69
3"	77	354.62	182.63	537.25	4.61	2.37	6.98
4"	75	321.88	194.32	516.20	4.29	2.59	6.88
6"	70	427.73	272.26	699.99	6.11	3.89	10.00
8"	3	13.75	.25	14.00	4.58	.08	4.66
10"	1	3.60		3.60	3.60		
Total	6481	$11,717.95	$3,003.82	$14,721.77			

TABLE "K"

Cost of Installing Meters Year Ending June 30, 1920

Size	No.	Lab. and Car.	Material	Total	Ave. Lab. and Car.	Ave. Mat.	Ave. Cost
⅝"	11371	$4,844.88	$76,185.70	$81,030.58	.43	6.70	7.13
¾"	2021	900.26	18,997.40	19,897.66	.44	9.40	9.84
1 "	301	181.40	4,063.50	4,244.90	.60	13.50	14.10
1½"	75	124.68	1,980.00	2,104.68	1.66	26.40	28.06
2 "	121	404.16	4,416.50	4,820.66	3.34	36.50	39.84
3 "	51	279.43	4,845.00	5,124.43	5.48	95.00	100.48
*3 "	10	....	....	....	....	......	......
*4 "	16	....	....	....	....	......	......
*6 "	17	....	....	....	....	......	......
*10 "	2	....	....	....	....	......	......
*8 x 4	1	....	....	....	....	......	......
*6 x 3	1	....	....	....	....	......	......
*10 x 3	1	....	....	....	....	......	......
*10 x 6	2	....	....	....	....	......	......
*12 x 6	1	....	....	....	....	......	......
		$6,734.81	$110,448.10	117,222.91			

*Set by Consumer.

Cost of Meter Testing Year Ending June 30, 1920

Size	Number	Flows	Cost	Ave.
⅝"	24384	Full to ⅛"	$1,637.86	.0671
¾"	4970	Full to ⅛"	412.96	.0830
1 "	1342	Full to ⅛"	202.29	.1506
1½"	169	Full to ⅛"	107.30	.6349
2 "	263	Full to ⅛"	190.29	.7235
3 "	93	Full to ⅛"	185.20	1.9913
4 "	40	Full to ⅛"	126.91	3.1727
6 "	15	Full to ⅛"	70.65	4.7100
Misc.	6	Full to ⅛"	44.88	7.4800
	31282		$2,978.34	

DATA CONCERNING METER DEPT.

Year Ending June 30, 1920

FINANCIAL

Value of tools, equipment, fixtures, not including building and power plant		$ 10,047.98
Value of meters in stock July 1st, 1920		106,268.10
Expended for meters according to annual reports to June 30th, 1919	$1,056,379.76	
Value of meters set year ending June 30th, 1920	120,871.30	
	$1,177,251.06	
Value of meters in service June 30th, 1920 estimated on basis of depreciation of 2½%		$1,147,819.79
Grand Total		$1,264,135.87
Expended for meters during year ending June 30th, 1920	$ 36,251.20	
Meters lost or stolen and billed year ending June 30th, 1920	1,587.82	
	$ 34,663.38	
Meters sold during year ending June 30th, 1920	1,387.00	
	$ 33,276.38	

GENERAL

Number of meters in stock June 30th, 1919		19,666
Number of meters in stock not charged 1918-1919		249
		19,915
Number of meters purchased year ending June 30, 1920		3,974
Total in stock		23,889
New meters set year ending June 30th, 1920		13,911
		9,978
Number of meters condemned		44
Meters in stock July 1st, 1920		9,934
Number of meters in service June 30th, 1919		127,192
Number of meters in service and not charged 1918-1919		175
Number of meters set	30,603	127,367
Number of meters removed	16,692	
Net gain	13,911	13,911
In service June 30th, 1920		141,278

SUMMARY OF STATISTICS.

In Form Recommended by the New England Water Works Association

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Detroit Water Works
Detroit, Wayne County, Michigan.

GENERAL STATISTICS

Population by United States Census of 1920, 993,739.
Date of construction, 1827.
By whom owned: The Board of Water Commissioners of the City of Detroit.
Source of supply: Detroit River, near Lake St. Clair.
Mode of supply: Pumping.

PUMPING STATISTICS

Builders of pumping machinery—

- One 24,000,000 gallon, Compound Beam, Detroit Locomotive Works, Detroit.
- One 24,000,000 gallon, Compound Beam, Riverside Engine Works, Detroit.
- One 30,000,000 gallon, Compound Beam, Riverside Engine Works, Detroit.
- One 24,000,000 gallon, Triplex Expansion, E. P. Allis & Co., Milwaukee, Wisconsin.
- One 25,000,000 gallon Triple Expansion, Allis Chalmers Co., Milwaukee, Wisconsin.
- One 25,000,000 gallon, Triple Expansion, Holly Mfg. Co., Buffalo, N. Y.
- Three 30,000,000 gallon, Triple Expansion, Bethlehem Steel Co., South Bethlehem, Pa.

Description of fuel used—

a. Kind, bituminous, run of mine.
b. Brand of coal.
c. Average price of coal, per gross ton (2,240 lbs.) delivered at Water Works.. $6.53
d. Percentage of ash, from Laboratory Analyses...............11.2%
e. Wood, price per cord; none used.
Coal consumed for the year..............................71,941,000 lbs.
Amount of other fuel used, none.

Total pumping for the year:

High Service	17,582,510,000 gallons
Low Service	22,316,843,500 gallons
Intermediate Service	15,731,909,000 gallons
Total	55,631,262,500 gallons

All water when leaving Pumping Station is metered in Pumping Station grounds. The amount of water that passes through these meters is 96.7% of the amount shown by plunger displacement, giving a slippage of 3.3%.

Average static head against which pumps work—126.4 feet.

Number of gallons pumped per pound of equivalent coal—773 gallons.

$$\text{Duty} = \frac{\text{Gallons pumped x } 8.34 \text{ (lbs.) x } 100 \text{ x dynamic head}}{\text{Total fuel consumed.}} = 81{,}538{,}449$$

Cost of pumping, figured on pumping station expenses	$389,164.96
Per million gallons pumped	7.00
Per million raised one foot (dynamic)	.0565

STATISTICS OF CONSUMPTION OF WATER

Estimated total population at date, City of Detroit	993,739
Estimated population of lines of pipe	1,066,240
Estimated population supplied	1,066,240
Total consumption for the year	55,631,262,500
Average daily consumption	151,997,985
Gallons per day to each inhabitant	142.6*
Gallons per day to each consumer	142.6*
Cost of supplying water per million gallons, figured on total maintenance	$12.36
Total cost of supplying water per million gallons, figured on total maintenance plus interest on bonds	$15.02

STATISTICS RELATING TO DISTRIBUTION SYSTEM (Mains)

Kind of pipe, cast iron.

Sizes, from 2 inch to 48 inch.

Extended during year	576,606 feet	109.00 miles
Discontinued during year	26,371 feet	5.00 miles
Total now in use	7,223,530 feet	1,368.09 miles
Cost of repairs per mile		$17.96
Number of leaks per mile		0.151
Length of pipe less than 4 inch diameter		10.06 Miles
Number of hydrants (public) added during the year		615
Number of hydrants (public) now in use		8,766
Number of cisterns now in use		516
Capacity of cistern		3,772,000 gallons
Number of stop-gates added during year		975
Number of stop-gates now in use		13,976
Number of blow-offs		1,120
Number of stop-gates smaller than 4 inch		29

Range of pressure on main, 35 lbs. to 78 lbs.

*Highland Park eliminated.

SERVICES

Kind of pipe, lead and cast iron.

Sizes, ⅝ inch to 12 inch.

Net number of service taps added during year	10,572
Number now in use for all purposes	164,779
Number now in use for the actual distribution of water in the city proper	142,832

Average length of service, approximately 30 feet.

Number of meters added	14,086
Number of meters now in use	141,278
Percentage of services metered	97.4%
Percentage of receipts from metered water	96.5%

REPORT OF THE CIVIL ENGINEER.

To the Board of Water Commissioners of the City of Detroit, Michigan.

Gentlemen:

I submit herewith a report for the year ending June 30, 1920, covering progress made on the work under charge of this office, consisting of the design and construction of the Booster or Low Lift Pumping Station; the Filtration Plant; Cold Storage Sheds and Conveying Apparatus; reconstruction of the Boiler House and Equipment; alterations to roof of Old Pumping Station, and erection of two 40,000,000-gallon Pumping Engines.

TEMPORARY OFFICE BUILDING

In July, 1919, contract was let for a temporary office in Water Works Park for the Civil Engineer and his staff; a frame building, 20 by 100 feet, at a cost of $5,891.00, and the force was moved into the new office September 17, 1919.

LOW LIFT PUMPING STATION

Work was started immediately on the design of the Low Lift or Booster Pumping Station, and the plans revised to the point of minimum cost consistent with adequate requirements for the service contemplated. The station is designed to house five electrically operated centrifugal pumps having a combined capacity of 465 million gallons daily, for service in raising the water from the intake tunnel to the Coagulation Basins of the Filter Plants or, in the event of extreme low water in the river, to be utilized as a Booster Station to supply water to the suction ends of the present pumps in the old station during the interim prior to completion of the Filter Plant. Included within the station is a screen chamber having seven electrically operated revolving screens, through which the water will pass before delivery to the suction end of the centrifugal pumps.

A contract for two of the centrifugal pumps, one 100 million gallon and one 65 million gallon unit, was let to the Allis Chalmers Co. of Milwaukee in 1918, at a cost of $52,600.00, and these two pumps and motors are ready for delivery.

Contracts for the other equipment and material, and for the foundation and sub-structure of the Low Lift Pumping Station were let as follows:

Link Belt Co., Chicago, Revolving Screens and Motors, Sept. 21, 1919	$ 24,600.00
Flower Valve Mfg. Co., Detroit, Gate Valves and Motors 42" and 54", Sept. 25, 1919	26,699.00
U. S. Cast Iron Pipe & Fdy. Co., special castings 42" and 54", Sept. 25, 1919	11,077.11
Walsh Construction Co., Davenport, Iowa, Foundation and Substructure of Station, Feb. 24, 1920	268,850.00
Making a Total of	$331,226.11

Budget allowances of $375,000.00 and $58,000.00, or a total of $433,000.00, were available for these contracts, the balance of $101,774.00 being required for three additional pumps and sundries.

The Walsh Construction Co. started actual work on excavating for Low Lift Pumping Station on March 27, 1920, and up to June 30, 1920, work to the value of $37,302.38, or about 14% of the contract had been completed.

Work on the Screens, Gate Valves and cast iron Specials was well advanced also on that date, and all of this equipment will be delivered in ample time.

BOILER HOUSE AND EQUIPMENT

An addition to the boiler house of the old pumping station was commenced in 1919 and completed, and the two new boilers put in service in January, 1920. The work involved the construction of a brick and steel boiler house, 54x90 feet, and the erection of two 400 horsepower Babcock & Wilcox high pressure boilers, equipped with Taylor stokers, and complete foundation for a third boiler. The work of constructing the foundations and sub-structure below the level of the boiler room floor was done by the Water Board, the superstructure and all equipment having been furnished and erected under contracts. The following is the cost in detail of this work:

Foundations and Substructure	Water Board force	$ 23,458.36
Superstructure—Brickwork	Lennane Bros	17,516.00
Structural Steel	F. A. Chapper Iron Wks	11,323.00
Miscellaneous Iron Work	Brown Hutchinson Co	2,209.84
Waterproofing	Western Waterproofing Co	985.00
Ash Handling Equipment	Kirchner-Purcell Co	3,190.00
Boiler	Babcock & Wilcox Co	25,824.50
Stokers	American Engr. Co	11,600.00
Boiler Setting	Robert A. Morrow	5,595.00
Steam Piping and Insulation	Johnson-Larsen Co	18,082.00
Total		$119,795.70

In March, 1920, contracts were let for one additional 400 horsepower boiler and stoker at the following prices:

One 400 H. P. boiler, Babcock & Wilcox Co.	$15,786.00
One Taylor stoker, Amer. Engr. Co.	4,400.00

The work on this boiler is in progress and should be installed and ready for service by October, 1920.

Plans are well under way for remodeling the remainder of the old boiler house and the gradual substitution of new high pressure boilers for the old ones, some of which are now obsolete. The tearing out of the old horizontal boilers is in progress, and as soon as this is completed, work will be started on the foundation for the new stack.

NEW ROOF ON OLD PUMPING STATION

In anticipation of some essential repairs to the roof of the old pumping station, extended investigations were made of the old trusses, when it was found that theoretically they were too light to support their existing load, and decidedly too light to permit the addition of the further contemplated dead load incidental to properly sheathing under the tile. In consequence it was decided to replace the whole steel structure of the roof. Plans and specifications were prepared and after duly advertising, a contract for furnishing and erecting complete new trusses, with pyrobar sheathing and replacement of tile roof, was awarded to the Wisconsin Bridge & Iron Co. A budget appropriation of $85,000.00 was provided for this work, the actual cost being as follows:

Roof complete, Wisconsin Bridge & Iron Co.	$59,068.84
Painting roof and walls, Holden B. White	2,800.50
Total	$61,869.34

The contract, which was let in August, 1919, was completed in April, 1920, and the new roof constitutes a marked improvement to the station.

NEW FORTY MILLION GALLON PUMPING ENGINES

The two forty million gallon triple expansion crank and flywheel pumping engines, which were contracted for in January, 1917, the completion of which was materially delayed on account of the war, were practically finished by the end of the fiscal year, and were actually started in service on June 11, and July 5, 1920, respectively.